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Combating marine plastic litter and microplastics: An assessment of the effectiveness of relevant international, regional and subregional governance strategies and approaches

Summary

The Executive Director of the United Nations Environment Programme presents to the United Nations Environment Assembly an assessment "Combating marine plastic litter and microplastics: An assessment of the effectiveness of relevant international, regional and subregional governance strategies and approaches". This assessment is divided conceptually into two parts. The first part is a mapping study that provides insight into the current state of the governance strategies and approaches at the international, regional and sub-regional levels within the context of marine plastic litter and microplastics and identifies gaps. The second part of the assessment extends the discussion on policy gaps and provides policy options. These options include:

- Review and revise existing frameworks to address marine plastic litter and microplastics and add a component to coordinate industry;
- A new global architecture with a multilayered governance approach

This assessment was developed in response to the resolution on Marine Plastic Litter and Microplastics (UNEP/EA.2/Res. 11) adopted by the second session of the UN Environment Assembly".

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[1] UNEP/EA.3/1.

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TABLE OF ACRONYMS

3Rs + Return	Reduce, Reuse, Recycle and Return
6Rs	Reduce, Redesign, Refuse, Reuse, Recycle and Recover
ACAP	Agreement on the Conservation of Albatrosses and Petrels
ACC	American Chemistry Council
ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and contiguous Atlantic area
ALDFG	Abandoned, lost and discarded fishing gear
ASCOBANS	Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas
BEP	best environmental practice
BAS	best available science
BAT	best available techniques, best available technology
BPA	Bisphenol A
BSC	Convention on the Protection of the Black Sea against Pollution (Bucharest Convention)
CBD	Convention on Biological Diversity
CCAMLR	Convention for the Conservation of Antarctic Marine Living Resources
CMS	Convention on the Conservation of Migratory Species of Wild Animals
COP	Conference of the Parties
DFG	Derelict fishing gear
EEZ	Exclusive economic zone
EIA	Environmental impact assessment
EPR	Extended producer responsibility
ESM	Environmentally sound management
EU	European Union
FAIP	Fisheries and Aquaculture Innovation Platform
FAO	Food and Agricultural Organization of the United Nations
UNFSA	United Nations Fish Stocks Agreement
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GES	Good environmental status
GESAMP	Group of Experts on the Scientific Aspects of Marine Environmental Protection
GNC	Global Network of the Committed
GPA	Global Programme of Action for the Protection of the Marine Environment from Land-based Activities
GPML	Global Partnership on Marine Litter
GPWM	Global Partnership on Waste Management
HELCOM	Helsinki Commission - Baltic Marine Environment Protection Commission
ICARM	integrated coastal and river basin management approach
ICM	integrated coastal management
IMO	International Maritime Organisation
IPCC	Intergovernmental Panel on Climate Change
IETC	International Environmental Technology Centre
ISWA	International Solid Waste Association
ITLOS	International Tribunal for the Law of the Sea
IUCN	International Union for Conservation of Nature
LBA	Land-based activities
LBS	Land-based sources
LDC	Least developed country

MARPOL	International Convention for the Prevention of Pollution from Ships
MAT	most appropriate technology
MEA	Multilateral Environmental Agreement
MEPC	Marine Environment Protection Committee
MPL/MP	Marine plastic litter and microplastics
MRF	Materials recycling facility
MSFD	Marine Strategy Framework Directive (EU)
NDC	Nationally Determined Contribution
NGO	Nongovernmental organization
OECD	Organisation for Economic Co-operation and Development
OCS	Operation Clean Sweep
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PCBs	Polychlorinated biphenyls
POPs	Persistent organic pollutants
PRF	Plastics recovery facility
PSMA	Port State Measures Agreement
RFMO	Regional Fisheries Management Organisation
ROPME	Regional Organisation for Protection of the Marine Environment
RSCAP	Regional Seas Conventions and Action Plans
SAICM	Strategic Approach to International Chemicals Management
SEA	Strategic environmental assessment
SDGs	Sustainable Development Goals
SIDS	Small Island Developing States
SMM	Sustainable Material Management
RSP	Regional Seas Programme
TBT	Technical barriers to trade
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEA	United Nations Environment Assembly
UNEP	United Nations Environment Programme
UNEPMAP	Coordinating Unit for the Mediterranean Action Plan Secretariat to the Barcelona Convention and its Protocols
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	UN General Assembly
UNIDO	United Nations Industrial Development Organisation
WHO	World Health Organisation
WtE	Waste-to-Energy
WTO	World Trade Organization

Executive summary

The United Nations Environment Assembly has at its two previous sessions highlighted marine plastic debris and microplastics amongst the issues of global importance. At the second session, resolution UNEP/EA.2/Res.11 on Marine Plastic Litter and Microplastics was adopted, in which governments requested an assessment of the effectiveness of relevant international, regional and sub-regional governance strategies and approaches to combat marine plastic litter and microplastics, taking into consideration the relevant international, regional and sub-regional regulatory frameworks. The resolution called for identification of possible gaps a well as options for addressing these gaps.

The development of the assessment was supported by an interdisciplinary advisory group consisting of experts nominated by Governments and major groups and stakeholders. In addition to webinars, two workshops were convened. The first was attended by a panel of experts focusing on mapping the current legal and policy frameworks at the international and regional levels and identifying gaps. The second workshop was attended by the Advisory Group focusing on further identification of gaps and the elaboration of options for closing these gaps.

The negative impacts of marine plastic litter and microplastics are widely recognized as unacceptable at the biological, ecological and the socio-economic levels. The UNEA-2 technical report entitled "Marine plastic debris and microplastics – Global lessons and research to inspire action and guide policy change" provided a comprehensive insight into the issues.[3] In addition, the First Global Integrated Marine Assessment indicates, "Litter disposal and accumulation in the marine environment is one of the fastest-growing threats to the health of the world's oceans."[4] The annual global rate of plastic production has continued to grow exponentially without a parallel increment in management measures, resulting in an ongoing contribution to marine plastic litter and microplastics from land, air and ocean. A recent study estimates the following:

- 8,300 million metric tons (Mt) of virgin plastics have been produced to date,
- 6,300 Mt of plastic waste has been generated as of 2015,
- Of this waste, 9% has been recycled, 12% incinerated, and 79% has accumulated in landfills or the natural environment.
- 12,000 Mt of plastic waste will be in landfills or in the natural environment by 2050 under current production and waste management trends.[5]

Plastic litter and microplastics are a source of macro- or micrometer- and nanometer-sized plastics in marine environments that contribute significantly to marine and coastal pollution.[6] In some organisms, if ingested or inhaled, may transfer from the lungs and guts of organisms to their cells and tissues.[7] Research has indicated that synthetic microfibers are also present in the atmosphere, providing a pathway for contamination by microplastics through atmospheric fallout.[8]

Long-term solutions include improved governance at all levels as well as behavioral and system changes, such as a more circular economy and more sustainable production and consumption patterns. The most urgent short-term solution to reducing plastic inputs, especially in developing economies, is improving waste collection and management.[9]

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[3] United Nations Environment Programme (UNEP), *Marine plastic debris and microplastics – Global lessons and research to inspire action and guide policy change* (United Nations Environment Programme, Nairobi, 2016).

[4] DOALOS, *First Global Integrated Marine Assessment. Chapter 25 "Marine debris"* (UN Division for Ocean Affairs and the Law of the Sea, 2015).

[5] Geyer, R. et al, 'Production, use, and fate of all plastics ever made' (2017) 3(7) *Science Advances*

[6] United Nations Environment Programme (UNEP), above n 3.

[7] Browne, M. A. et al, 'Accumulation of Microplastic on Shorelines Woldwide: Sources and Sinks' (2011) 45(21) (2011/11/01) *Environmental Science & Technology* 9175-9179.; Browne, M. A. et al, 'Microplastic Moves Pollutants and Additives to Worms, Reducing Functions Linked to Health and Biodiversity' (2013) 23(23) *Current Biology* 2388-2392.; Collard, F. et al, 'Microplastics in livers of European anchovies (Engraulis encrasicolus, L.)' *Environmental Pollution*

[8] Dris, R. et al, 'Synthetic fibers in atmospheric fallout: A source of microplastics in the environment?' (2016) 104(1) (2016/03/15/) *Marine Pollution Bulletin* 290-293.

This long-lasting and transboundary compound is a source of pollution that is not addressed under a single international legally binding instrument. Global instruments exist to protect biodiversity, manage hazardous chemicals and waste, and prevent pollution of the marine environment from ocean sources and, to a lesser degree, land-based sources of pollution. Some applicable measures are weakly distributed amongst these global instruments, but the reduction of marine plastic litter and microplastics is not a primary objective of any.

At the global level, the United Nations Convention on the Law of the Sea (UNCLOS), which sets out the legal framework within which all activities in the oceans and seas must be carried out, provides for the general obligation to protect and preserve the marine environment and includes the obligation to take all measures necessary to prevent, reduce and control pollution of the marine environment from any source. These measures must include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life.

International binding agreements with relevance to the issue of marine plastic litter and microplastics vary in scope, objectives, applicable approaches and principles, including reporting and compliance requirements. These include:

- Pollution oriented agreements
    - United Nations Convention on the Law of the Sea (UNCLOS);
    - The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 (London Convention) and its 1996 Protocol (the London Protocol);
    - Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL);

- Biodiversity and species oriented agreements
    - The Convention on Biological Diversity (CBD);
    - The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (United Nations Fish Stocks Agreement);

- Chemicals and waste oriented agreements
    - The Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention); and
    - The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention).

Other global instruments applicable to the issue are narrower in their approach. Importantly, there are no binding agreements at the international level for which the reduction of marine plastic litter and microplastics is a primary objective.

At the regional level, overarching legally binding instruments have been adopted by States in fourteen regions for the preservation of their regional seas,[10] nine of which have adopted corresponding protocols related to land-based sources and activities.[11] However, four of these protocols[12] and one convention are not yet in force. In place of protocols, States in two regions have adopted annexes to the conventions that are also not specific to the prevention of marine plastic litter and microplastics but would encompass such efforts.[13] The remaining four regional seas have adopted voluntary regional action plans with no overarching binding conventions.[14] Only five of the Regional Seas programmes include the high seas in the duty to prevent transboundary harm. In some regions, many of the gaps within the binding regional frameworks are addressed in voluntary regional action plans specific to the reduction of marine litter. The mandate to manage "upstream" activities within the lifecycle of plastics is inconsistent across the Regional Seas programmes.

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[9] United Nations Environment Programme (UNEP), above n

[10] These are the North-East Pacific, the ROPME Sea, the South-East Pacific, the North-East Atlantic, the Mediterranean Sea, the Black Sea, the Wider Caribbean, the Red Sea & Gulf of Aden, Eastern Africa, Western Africa, the Caspian Sea, the Antarctic, the Pacific and the Baltic.

Non-binding instruments have been adopted at the global level, including the FAO Code of Conduct for Responsible Fisheries (Code of Conduct). This addresses the problem of abandoned, lost or otherwise discarded fishing gear by providing for adoption by States of appropriate measures that inter alia minimize catch by such fishing gear through measures including the development and use of selective, environmentally safe and cost-effective fishing gear and techniques. The Regional Fisheries Bodies have adopted various measures regarding pollution in general, but few address all the impacts of abandoned, lost or otherwise discarded fishing gear.[15]

Marine pollution from land-based sources is addressed in the voluntary/soft law Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA). The GPA is currently the only global intergovernmental mechanism entirely dedicated to addressing this issue. Marine Litter is one of the priority source categories under the GPA.

In terms of strategies, the Honolulu Strategy – a Global Framework for Prevention and Management of Marine Debris suggests approaches to reducing marine litter from land- and sea-based sources but provides no measurable targets or timelines.

In addition, relevant goals and calls for action have been included in the outcome document of the United Nations Conference on Sustainable Development (2012), entitled "The future we want" and the outcome document of the United Nations summit for the adoption of the post-2015 development agenda (2015), entitled "Transforming our world: the 2030 Agenda for Sustainable Development" (in particular Sustainable Development Goal 14 included therein). The General Assembly resolutions on oceans and the law of the sea and on sustainable fisheries have also included relevant goals and calls for action.

The major gaps and challenges in the international, regional and sub-regional frameworks, as assessed by the panel of experts and the Advisory Group, include:

- No global institution with the mandate to coordinate current efforts and manage the issue upstream from the extraction of raw materials, design and use phases of plastic polymers and additives to final treatment and disposal;
- A lack of harmonized binding standards at the global level for the mitigation of pollution by plastic waste, particularly from land-based sources;
- A lack of global standards for national monitoring and reporting on consumption, use, final treatment and trade of plastic waste;

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[11] These are the ROPME Sea, the South-East Pacific, the Mediterranean Sea, the Black Sea, the Wider Caribbean, the Red Sea & Gulf of Aden, Eastern Africa, Western Africa and the Caspian Sea.

[12] These are the Black Sea, the Red Sea and Gulf of Aden, Western Africa and the Caspian Sea.

[13] These are the OSPAR and Antarctic Regions.

[14] These are the North-West Pacific, East Asian Seas, South Asian Seas and the Arctic region.

[15] For more on RFMO measures, see Raubenheimer, K., *Towards an Improved Framework to Prevent Marine Plastic Debris* (Doctoral Thesis, University of Wollongong, Australia, 2016) <http://ro.uow.edu.au/theses/4726/>. (Sect. 4.6.1).

- A lack of global industry standards for environmental controls and quality specifications of plastics;
- Little recognition at the international policy level of the potential risks to human health, particularly from micro- and nanoplastics, and the application of the precautionary principle and of freedom of information in this regard;
- Geographic gaps in the coverage of existing agreements, particularly on the high seas, but also with regard to internal waters and watersheds;
- Gaps in the development of legally binding instruments in key regions to manage marine pollution originating from land;[16]
- A fragmented approach at the regional level to waste management, including wastewater treatment. This fragmented approach extends to the national level in many countries;
- Lack of data in some regions on the sources and the extent of plastics and microplastics in the marine environment, in organisms and on the associated health and ecosystem risks;
- Poor application of due diligence and the polluter pays principle within the various sectors of the plastics industry;
- Poor/inadequate design of products to meet air and water quality standards in order to reduce emission of microplastics from wear and tear during use of the product, as well as evaluating compliance with such standards when conducting lifecycle and environmental impact assessments;
- A failure to establish sustainable and profitable end-markets for all end-of-life plastics;
- A lack of effective compliance and enforcement mechanisms;
- No global liability and compensation mechanism for pollution by plastic.

The global community could choose to 1) maintain the status quo and continue current efforts, 2) revise existing frameworks to better address marine plastic litter and microplastics or 3) develop a new international architecture with a multilayered governance appraoch. However, it is the strong opinion of the Advisory Group that the first approach is not a solution.

Efforts need to be made to improve coordination of activities and finding synergies under multiple multilateral environmental agreements (MEAs), as well as the monitoring of progress specific to the issue of plastic pollution. Harmonization of targets, reporting procedures, compliance and liability would be some of the challenges presented by a fragmented approach.

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[16] These include East Asian Seas, an area identified as a major source of marine litter. See Jambeck, J. R. et al, 'Plastic waste inputs from land into the ocean' (2015) 347(6223) *Science (New York, N.Y.)* 768-771.

The current framework needs to be strengthened to better address marine plastic litter and microplastics. It may be possible to amend specific instruments but limitations will remain. For example, the Convention on Biological Diversity could be amended to establish a duty to prevent plastic waste and microplastics, but this would only be in the context of conserving biodiversity. The Convention would not address the many sources, such as plastic production or the tourism industry. Existing conventions and instruments that could be amended to better regulate plastic waste and microplastics are discussed in further detail and a summary provided in Table 3.

An approach that engages all sectors, including the plastics industry, is more likely to be effective at a global level. This requires a mandate for governments to progress option 2 (at a minimum) or option 3 globally. An overarching international mechanism with a multilayered governance approach would provide opportunites for a cohesive and robust approach to reducing, if not eliminating, the ecological and socio-economic impacts of plastics by targeting urgent and significant global curtailment in the leakage of plastic waste into the environment.

The third session of the United Nations Environment Assembly (UNEA) presents an opportunity for the global community to deliberate the legal and policy options presented in this assessment. The urgency of the problem, associated with the increased production of plastics and its durability in the marine environment, requires consideration to be given to the immediate option of establishing the mandate to progress these options globally and to engage and encourage industry in the solutions.

Should the decision be taken at UNEA-3 to progress with option 3:

- The decision could be made to adopt an Open Ended Working Group (OEWG) or an Intergovernmental Negotiationg Committee (INC).
- Following this, negotiation of a new international legally binding instrument could take to 3-4 years to complete.
- Depending on political commitment, a new agreement could come into force 4 years later.

The table below summarizes the possible legal and policy options, which are discussed in further detail in Section 5.

Summary of the legal and policy options

	Option 1: **Maintain Status Quo**	**Option 2:** **Revise and strengthen existing framework, add components to address industry**	**Option 3:** **New global architecture with multilayered governance approach**
Global umbrella mechanism specific to marine plastic litter and microplastics	Not recommended	Yes - Voluntary	Yes – Binding (combination of legally binding and voluntary measures)
Potential implementation methods	• Strengthen the implementation of existing instruments, including the Regional Seas programmes and relevant multilateral environmental agreements. • Monitor developments under the Basel Convention that aim to further address marine plastic litter and microplastics within the scope of the Convention.	• Expand the mandate of an existing international body to include the coordination of existing institutions in the field of marine plastic related action. The coordination shall include: - Building linkages between relevant instruments, e.g. the Basel Convention. - Harmonizing international legal instruments and approaches in Regional Seas programmes. - Promoting the implementation of the sustainable development goals, specifically SDG14. - Encouraging and coordinate industry-led solutions and commitments. • Strengthen and add measures specific to marine plastic litter and microplastics in Regional Seas programmes and other applicable instruments (See Table 3, Sect 2 for summary of options). • Revise e.g. the Honolulu Strategy to encourage improved implementation at the national level and agree on indicators of success. • Adopt a voluntary agreement on marine plastic litter incorporating at least the following measuresmeasures: - Standardize global, regional and national reporting on production, consumption and final treatment of plastics and additives. - Introduce voluntary national reduction targets. - Develop/improve global industry guidelines, (e.g. for the management of polymers and additives; adoption of global labeling and certification schemes).	• Establish a new international legally binding architecture. • In parallel, launch option 2 to take action in the interim and gain experiences that support the development of the legally binding architecture. The legally binding architecture could be implemented in two phases: • Phase I: Develop voluntary measures, including: - Introduction of self-determined national reduction targets. - Development/improvement of industry-led design standards that promote recovery and recycling. • Phase II: Develop a binding agreement, to include: - Ratification/accession procedures to confirm commitment by States. - An obligation to set self-determined national reduction targets. - Develop and maintain national inventories on production, consumption, final treatment and trade of plastics and additives. - Fixed timelines to review & improve national reduction targets. - A duty to cooperate to determine global technical standards to ensure minimum environmental and quality controls by industry. - A duty to cooperate to determine global industry standards for reporting, labeling & certification. - Measures to regulate international trade in non-hazardous plastic waste. - Compliance measures (monitoring & reporting). - Legal basis set for mechanisms for: liability & compensation, funding and information sharing. - Consideration of the needs of developing countries and regional differences (e.g. exemptions and extensions).

Key messages and recommendations

The presence of plastic litter and microplastics in the marine environment is of increasing concern despite substantial efforts by various stakeholders /actors around the world. There is considerable discussion at the international and regional levels on the issues and solutions. The topic is also on the agenda of international and regional associations of the plastics industry.

The political will to solve the problem is increasing, as shown through the calls for action included in General Assembly resolutions on oceans and the law of the sea and on sustainable fisheries, the targets included in Sustainable Development Goal 14 and a number of commitments offered by governments at the United Nations Ocean Conference held in New York in June 2017 and the adoption of the G20 Action Plan on Marine Litter. There is, however, still some confusion as to what legal and policy measures are most effective in the short-term and over the long-term. There is also a concern about the economic impacts of banning or restricting plastic use, as well as the availability and cost implications of alternatives. An understanding of emerging science, technical innovations and economic systems is necessary to inform policy design that encourages private sector funding and engagement from the various sectors of the industry. It is however key to note that the problem is escalating and that adequate information is available to take urgent and concerted action now.

While, in theory, existing instruments at the international and regional level could address many upstream and downstream aspects of marine plastic litter and microplastics, a high level of coordination would be required and expansion of the scope of these different instruments and secretariats. This may not be easily attained.

A more holistic and long-term approach is required to move beyond the business as usual scenario to reverse the current trend of increasing volumes of plastics in the oceans. A combination of binding, voluntary and self-regulatory measures are necessary to manage the complexities of the lifecycle of plastics, including the international trade of products, components and waste. Due diligence of industry must play a role in progressing towards environmentally sustainable production, consumption and disposal of plastics and their chemical additives.

Greater recognition of the long-term impacts of marine plastic litter and microplastics, acknowledgement of the potential risks to human health and food security, and the piloting of economically viable solutions for closing the materials loop, waste management and minimization are integral to the required shift in current processes to combat the flow of plastic wastes into our oceans. With no viable option for removal of plastics from the marine environment, the most economically feasible option is prevention. The time is now to act to enable protection of land and ocean environments from the long-term impacts of marine plastic litter and microplastics. All stakeholders, including industry, need to recognize this.

This assessment has considered the current legal and policy frameworks, including current efforts to combat marine plastic litter and microplastics. It has presented three policy options for consideration. Due to the failure of the current fragmented and uncoordinated regime to combat marine plastic litter and microplastics, the focus has been on options of a revised and strengthened framework (option 2) or a new framework (option 3).

The following recommendations follow from the assessment:

- UNEA 3 to establish the mandate to progress on one (or more) of the option(s) presented.

Included in this mandate would be the urgent need to make immediate progress on the following voluntary measures, as presented in this assessment:

- Assess the feasibility of progressing each of the three options presented.
- Immediately progress the following voluntary measures, as presented in this Assessment:
    - Developing and harmonizing marine litter action plans, including monitoring of microplastics,

  - Develop global industry-led self-regulated guidelines,
  - Develop global labeling and certification schemes,
  - Improve national reporting on production, consumption, trade, chemical additives and final treatment and trade of plastic waste.
- Establish or strengthen an international body to coordinate these measures.
- As per COP decision BC-13/11 and decision BC-13/17, investigate options under the Basel Convention to address the issue.
- Advance platforms for information sharing between industry, researchers, entrepreneurs, NGOs and policymakers.
- Consider options to regulate import and export of plastic waste with the aim of establishing transparent, stable and environmentally sustainable end-markets for plastic waste.
- Mainstream environmentally sound waste management and waste prevention into national development strategies with the aim of reducing marine plastic litter and microplastics.
- Develop waste profiles for high-leakage countries and provide assistance for the establishment of economically viable and tailored waste management services.
- Develop standardized methodologies for assessing impact from micro- and nanoplastics in marine organisms to further understand the full risk to aquatic ecosystems at community and population levels.
- Understand the risks associated with human consumption of microplastics via marine species.
- Consider options for a global funding mechanism to assist remediation in those countries, particularly Small Island Developing States that are an accumulation zone for marine plastic litter.

The key messages from this assessment on the existing legal and policy frameworks can be summarized as follows:

- UNCLOS, which sets out the legal framework within which all activities in the oceans and seas must be carried out, provides for the general obligation to protect and preserve the marine environment and includes the obligation to take all measures necessary to prevent, reduce and control pollution of the marine environment from any source, including from land-based sources, from vessels and by dumping. States are required to adopt laws and regulations which, depending on the source of pollution, must either take into account internationally agreed rules, standards and recommended practices and procedures (e.g. laws and regulations relating to land-based pollution), be no less effective than the global rules and standards (e.g. laws and regulations relating to dumping) or have the same effect as that of generally accepted international rules and standards (e.g. laws and regulations relating to pollution from vessels). Measures must include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life. UNCLOS includes extensive provisions on enforcement in respect of the various sources of pollution, and provides for global and regional cooperation and coordination for the protection and preservation of the marine environment. However, implementation of these provisions should be strengthened at the global, regional and national levels, including through the adoption of adequate implementing legislation and by mainstreaming oceans issues.

- MARPOL Annex V and the London Convention and Protocol together prohibit the discharge or dumping directly into the ocean of wastes containing plastics. The International Maritime Organization is working to identify and close the gaps within particular waste streams permitted under the London Protocol for dumping in certain circumstances. These waste streams may introduce macro- and microplastics into the marine environment. There are, however, implementation and compliance challenges concerning MARPOL Annex V and exemptions that exclude most fishing vessels from relevant measures. The Basel Convention provides the most comprehensive approach to the issue. Parties to the Basel Convention are currently exploring options to further address marine plastic litter and microplastics within the scope of the Convention, while avoiding duplication with activities relating to this matter in other forums. The provisions of the Convention with respect to waste minimization, the environmentally sound management of wastes generated and the transboundary movement thereof apply to plastic wastes. Several technical guidelines, in particular regarding the identification and environmentally sound management of plastic wastes and for their disposal, provide comprehensive guidance on the matter.
- The additives used in the lifecycle of plastics are numerous and the risks to human health and the marine environment are not adequately reflected in legal and policy frameworks at the international and regional level.
- The Stockholm Convention on Persistent Organic Pollutants provides for some regulation of the production, use and disposal of additives used in the manufacture of plastics. The application of the Stockholm Convention is limited to those plastics produced with persistent organic pollutants (POPs) listed under the Convention and may have implications for the recycling and reuse of products that contain regulated chemicals.
- The Global Action Plan developed under the Strategic Approach to International Chemicals Management (SAICM) can provide a voluntary foundation for managing those chemicals not regulated under the Stockholm Convention and assist in setting national reduction targets.
- The Regional Seas programmes are fragmented in their legal structure in general and also specifically in addressing land-based sources of pollution. In addition, the instruments have different levels of ratification/accession.
- Among the regional instruments addressing land-based sources of pollution, several are not yet in effect. Those instruments that are in force differ with respect to geographic scope and substantive implementation at the national level.
- Some regions have not adopted binding instruments, opting for non-binding action plans. In some regions, most of the gaps have been addressed through marine litter action plans, but these are varied in their approaches and methodologies.
- Engagement with industry, application of the principle of extended producer responsibility and the 6R approach (reduce, redesign, refuse, reuse, recycle, recover) are found in the non-binding global and regional strategies. Similar to the regional binding instruments, the non-binding regional instruments also display a varied approach to addressing marine plastic litter and microplastics.
- Strengthening the Regional Seas Programme to address marine plastic litter and microplastics would require expanding the adoption of binding instruments, or at a minimum, developing action plans specific to the management of marine

litter where none exist and coordinating the approaches across all regions while recognizing regional differences.

- Increased capacity of Regional Seas secretariats is required in some regions to assist Members, particularly developing countries, to overcome a lack of standards, legislation and regulations to implement upstream interventions or the required waste management services, including port reception facilities. Significant capacity support will be needed to develop their legislative frameworks and to conduct periodic monitoring and evaluation in order to comply with reporting requirements.
- While, in theory, existing instruments at the international and regional level could address many upstream and downstream aspects of marine plastic litter and microplastics, a high level of coordination would be required and expansion of the scope of these different instruments. This may not be easily attained.
- It is necessary to mainstream the issue of environmentally sound waste management and waste prevention into national development strategies. This often requires prioritizing waste management alongside other priority issues such as climate change or poverty reduction.
- International standards are required to manage the lifecycle of plastic, including providing transparent and stable end-markets for plastic waste. Standards can also include quality standards for the types of plastics produced for domestic and international markets to reduce off-specification plastics and prevent market re-entry of regulated chemicals.
- Source-reduction strategies are more cost-effective to implement than removal.[17] Prevention can bring economic benefits through reducing the costs to industries as well as environmental damage, which are "avoidable costs."[18]
- A combination of binding, voluntary and self-regulatory measures are necessary to manage the complexities of the lifecycle of plastics, including the international trade of products, different components of products and waste. Due diligence of industry must play a role in progressing towards environmentally sustainable production, consumption and disposal of plastics and their chemical additives.

Some of the efforts by the plastics industry to reduce marine litter are highlighted in this assessment. The objective of doing so is to show the industry's recognition of the issues presented by plastic products, particularly once they become waste and enter the environment. These efforts by industry should encourage further alignment of international, regional and sub-regional legal and policy frameworks with the desire of industry to work towards solutions. The internalization of the costs currently borne mostly by society and the public sector should be a collaborative effort between industry, the scientific community, policymakers, NGOs and other relevant stakeholders.

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[17] Sherman, P. and van Sebille, E., 'Modeling marine surface microplastic transport to assess optimal removal locations' (2016) 11(1) *Environmental Research Letters* 014006.

[18] McIlgorm, A. et al, 'Understanding the economic benefits and costs of controlling marine debris in the APEC region (MRC 02/2007). A report to the Asia-Pacific Economic Cooperation Marine Resource Conservation Working Group by the National Marine Science Centre (University of New England and Southern Cross University), Coffs Harbour, NSW, Australia, December.' (2009) ; McIlgorm, A. et al, 'The economic cost and control of marine debris damage in the Asia-Pacific region' (2011) 54(9) *Ocean & Coastal Management* 643-651.

1. Rationale for the Assessment

1.1. Marine Plastic Litter as a Global Challenge

Since the material was more widely introduced in the 1950's, plastic has become indispensable in our economic and social development, and has offered a great many benefits to humanity covering every sector from health and food preservation, through to transportation and enhancing the digital age. Today, we are inundated by plastic waste as a result of our careless approach to the use and, more so, the lack of planning for the post-use life of this durable material which has been accompanied by a significant social, economic and ecological cost.[19] In addition, the First Global Integrated Marine Assessment indicates, "Litter disposal and accumulation in the marine environment is one of the fastest-growing threats to the health of the world's oceans."[20] All areas examined in the ocean have revealed plastic. This continuing plastic pollution of the marine environment is caused primarily by land-based activities but also those at sea. The large quantities of plastics now in the ocean are there as a result of our failure to deal with plastics in a more considered and sustainable manner. It is likely that this pattern will continue, but it will require a great collective effort to improve our production and use of plastics, close the material loop and to minimize the proportion of end-of-life plastic that enters the waste stream.

The terminology used to describe discarded plastic objects, particles and fragments in the ocean has the potential to cause confusion amongst different stakeholders, and is a matter of debate. Other terms that are frequently used include marine plastic debris, marine litter, marine plastic litter and ocean trash. 'Litter' and 'debris' are also used to describe naturally occurring material in the ocean, such as wood, pumice and floating vegetation.

Marine plastic litter is a form of pollution and is an example of a market failure emphasizing the need for this assessment. Increasing levels of marine plastic litter in the world's seas and oceans are having a major environmental, economic and social impact. Much of the literature on marine litter examines the prevalence and forms of marine litter, but little is mentioned on the nature, and magnitude, of costs that marine litter imposes on society.[21] Marine litter causes a range of economic impacts that both increase the costs associated with marine and coastal activities, and reduce the economic benefits derived from them (Bergmann et al. 2015). The direct economic costs from marine litter refer to the additional expenditures incurred by different economic sectors and they are directly related to impacts from marine litter whereas indirect economic costs from marine litter refer to the negative impacts on the marine environment, human health as well as the negative impacts that marine litter causes on productivity across different marine sectors, and ultimately each country's Gross Domestic Product (GDP). Chapter 4 of this assessment sheds light on the cost of damage and remediation related to marine litter.

The UN Environment report "Marine Plastic Debris and Microplastics – Global Lessons and Research to Inspire Action and Guide Policy Change" prepared for the second session of the United Nations Environmental Assemblyprovided a comprehensive overview of the current state of knowledge; a background on marine plastic debris, including a definition of what it is, why it occurs, in what way it is a global problem, and what measures can be taken to reduce its impact. It also provided a series of recommendations, outlined areas for urgent action and research needs.

This Assessment aims to examine the effectiveness of relevant international, regional and subregional governance strategies and approaches to combat marine plastic litter and microplastics, taking into consideration the relevant international, regional and subregional regulatory frameworks, outline gaps and identify options for filling them.

1.2. United Nations Environment Assembly (UNEA) of the United Nations Environment Programme (UN Environment)

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[19] United Nations Environment Programme (UNEP), above n 3.

[20] DOALOS, above n 4.

[21] McIlgorm, A. et al, above n 18.

The inaugural session of the UNEA took place in Nairobi on 23-27 June 2014 as a consequence of agreements made at Rio+20 to strengthen the role of UN Environment as the leading United Nations environmental and coordinating body. The second session was held in May 2016. Marine plastic debris and microplastics was one of a number of issues highlighted at the two sessions of the United Nations Environment Assembly (UNEA) held to date.

The UNEA at its second session adopted resolution UN/EA.2/11 on Marine Plastic Litter and Microplastics, which, in operative paragraph 21 included a request to the Executive Director of UN Environment, in close cooperation with other relevant bodies and organizations, to undertake an assessment of the effectiveness of relevant international, regional and sub-regional governance strategies and approaches to combat marine plastic litter and microplastics, taking into consideration the relevant international, regional and sub-regional regulatory frameworks and identifying possible gaps and options for addressing them, and to present the assessment to the Environment Assembly at its next session, within available resources.

The Third Session of the United Nations Environment Assembly in December 2017 has a Pollution theme, during which member states will, among other things, discuss different options for action proposed in this assessment.

1.3. Structure of the assessment

This assessment is divided conceptually into two parts. The first part (section 2) is a legal mapping study and provides insight into the current state of the international legal framework for marine plastic litter and microplastics. The second part (sections 3-5) advances the discussion towards a more holistic approach that considers a wider range of impacts and provides options for a global lifecycle management structure.

Section 2 provides a mapping and comparative assessment of the current principal international, regional and sub-regional legal and policy frameworks in relation to marine plastic litter and microplastics. Some gaps are highlighted in Section 2.

The legal and policy instruments assessed in Section 2 have direct application to marine plastic litter and microplastics, with the exception of the broader land-based waste management strategies that would inherently lead to a reduction in marine plastic litter and microplastics. Sections 3 and 5 expand the current policy approach to managing marine litter and microplastics, introducing a wider range of instruments that can contribute to a more holistic approach to the issue.

Section 3 broadens the discussion on the gaps within the current policy framework and provides some perspective on the role industry can play in closing these gaps. A few industry trends are highlighted to illustrate the recognition by industry of the problem presented by their products. Including industry trends serves to strengthen the need for policy to support this momentum and move towards including industry solutions in future responses.

Section 4 makes the case for investment in prevention. It provides an economic perspective beyond the necessary costing to various economic sectors of the impact of marine plastic litter and microplastics. This provides an important consideration for policymakers when assessing the options available, particularly with regards to reducing the burden of marine plastic litter and microplastics on the public sector and on local communities.

Section 5 provides three options for consideration in meeting the global demand to combat marine plastic litter and microplastics. The option of maintaining the status quo adds to the mapping and assessment presented in Section 2. Two further options are outlined that aim to close the gaps in the current framework, taking into account the significant projected increases in plastic production. These options clearly move beyond the status quo and draw industry into the sustainable management of plastics, moving towards a global lifecycle approach and contributing to the achievement of a number of Sustainable Development Goals.

Section 6 outlines opportunities to investigate following the third session of the United Nations Environment Assembly (UNEA). Areas of synergy with existing institutions working on areas relevant to combatting marine plastic litter and microplastics are highlighted. This is followed by conclusions, recommendations and a summary in Sections 7.

1.4. Methodology

The UN Environment established the Advisory Group for this study, with an open call for all Member Sates and accredited Major Groups and Stakeholders (MGS) to nominate experts. The Advisory Group consisted of 32 members with scientific, legal and policy expertise from 27 countries, the European Comission and 3 MGSs. The proposed methodology was discussed in the first Advisory Group webinar held in February 2017.

Section 2 comprised an initial desktop study after developing a methodology for measuring effectiveness of the policy framework at the international, regional and sub-regional level. The methodology was based on two UN documents entitled 1) *Methodology for Reviewing the Coherent Implementation and Effectiveness of Multilateral Environmental Agreements (MEAs) at the National Level* and 2) *Guidelines on Compliance with and Enforcement of Multilateral Environmental Agreements*. The mapping and evaluation process provided a foundation for the initial Advisory Group review process. A 3-day Expert Workshop followed this at the end of March 2017, identifying gaps and suggesting options outlined in Section 2. Representatives of various Regional Seas and secretariats of international conventions and institutions attended the Expert Workshop.

The second Advisory Group webinar was held in April 2017 and discussions included further comments received on Section 2 from the first Advisory Group review process.

A 3-day Advisory Group workshop was held in May 2017. A revised draft of the assessment was circulated to the Advisory Group prior to the workshop. Discussions focused on the three policy approaches outlined in Section 5.

A final draft of the assessment was sent for the Advisory Group review process as well as a peer review process by relevant UN agencies, secretariats and institutions. Comments from the Advisory Group and peer reviewers were consolidated and incorporated into the assessment before a final Advisory Group webinar in August 2017 and submitting to the UN Environment.

2. Mapping Current Legal Frameworks

This section examines the effectiveness of the current global and regional legal framework relevant to addressing marine plastic litter and microplastics.

According to the UN Environment, the effectiveness of a multilateral environmental agreement (MEA) can be defined as the degree to which the implementation of the MEA in question has been successful in meeting its objectives.[22] The focus of the methodology is on measuring the effectiveness of MEAs at the national level.national level. However, this assessment, as a legal mapping study at the international, regional and sub-regional levels, will be limited to assessing "effectiveness" in terms of whether the instrument provides the necessary legal structure to address marine plastics litter and microplastics.

This does not include an examination of national implementation and its impact on the reduction of marine plastics litter and microplastics. Using this methodology to gauge existing gaps and inconsistencies, the assessment will provide a comparative overview of the principal global and regional instruments based on the following criteria: (1) obligation and scope of application of the instrument (2) applicable principles (3) measures of implementation (4) compliance and enforcement (5) cooperation for capacity building and technical support, research and development and exchange of scientific information.[23]

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[22] UNEP, *Methodology for reviewing the Coherent Implementation and Effectiveness of Multilateral Agreements (MEAs) at the National Level* (2012).

2.1. Existing global instruments and strategies

At the global level, there are different categories of binding instruments relevant to marine plastic litter and microplastics. In addition to the United Nations Convention on the Law of the Sea,[24] which provides for the general obligation to protect and preserve the marine environment, as well as specific provisions relating to pollution from different sources of pollution, the first category of instruments is pollution-oriented or related (London Convention[25] and Protocol on the prevention of marine pollution by dumping of wastes and other matter, International Convention for the Prevention of Pollution from Ships Annex V,[26] International Watercourses Convention[27]). The second is biodiversity or species oriented (Convention on Biological Diversity,[28] Convention on the Conservation of Migratory Species of Wild Animals, [29] and the United Nations Fish Stocks Agreement[30]) and the third is chemicals and waste oriented (Basel Convention,[31] Waigani Convention,[32] Bamako Convention[33] and the Stockholm Convention[34]).

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[23] There is a potentially wide range of legal instruments that could have relevance to addressing marine plastics litter and microplastics. However, this mapping must limit itself to those main international instruments with direct relevance.

[24] *United Nations Convention on the Law of the Sea* opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) ('*Law of the Sea Convention*') <http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf>.

[25] *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, opened for signature 13 November 1972, 1046 UNTS 120 (entered into force 30 August 1975) ('*London Convention*') <https://treaties.un.org/doc/Publication/UNTS/Volume%201046/volume-1046-I-15749-English.pdf>.; Amended by the 1996 Protocol

[26] *Regulations for the Prevention of Pollution by Garbage from Ships (Resolution MEPC.201(62))*, opened for signature 15 July 2011, (entered into force 1 January 2013) ('*MARPOL Annex V*') <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/Garbage/Documents/2014%20revision/RESOLUTION%20MEPC.201(62)%20Revised%20MARPOL%20Annex%20V.pdf>.

[27] *Convention on the Law of the Non-Navigational Uses of International Watercourses*, opened for signature 21 May 1997, UN Doc A/RES/51/229 (entered into force 17 August 2014) ('*UN Watercourse Convention*') <http://www.un.org/documents/ga/res/51/ares51-229.htm>.

[28] *Convention on Biological Diversity*, opened for signature 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993) ('*Convention on Biological Diversity*') <https://www.cbd.int/convention/text/default.shtml>.

[29] Convention on the Conservation of Migratory Species of Wild Animals (1979) 1651 UNTS 333

[30] *The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks*, opened for signature 4 December 1995, 2167 UNTS 3 (entered into force 11 November 2001) ('*United Nations Fish Stocks Agreement*') <https://treaties.un.org/doc/Treaties/1995/08/19950804%2008-25%20AM/Ch_XXI_07p.pdf>.

Figure 1 provides an overview of the current legal and policy framework with relevance to the management of the lifecycle of plastics. The instruments are grouped thematically based on their primary objective of the management of 1) pollution, 2) biodiversity and species, or 3) chemicals and waste. In addition, representing its range of coverage on land or oceans indicates the general geographic scope of each instrument. Numbers in parentheses indicate ratifications/accessions as of September 2017. The figure provides a general overview and therefore cannot illustrate all minor variations within the range of instruments presented.

Figure 1: Diagrammatic overview of relevant global and regional instruments
(Numbers in parentheses indicate ratifications/accessions as of September 2017)

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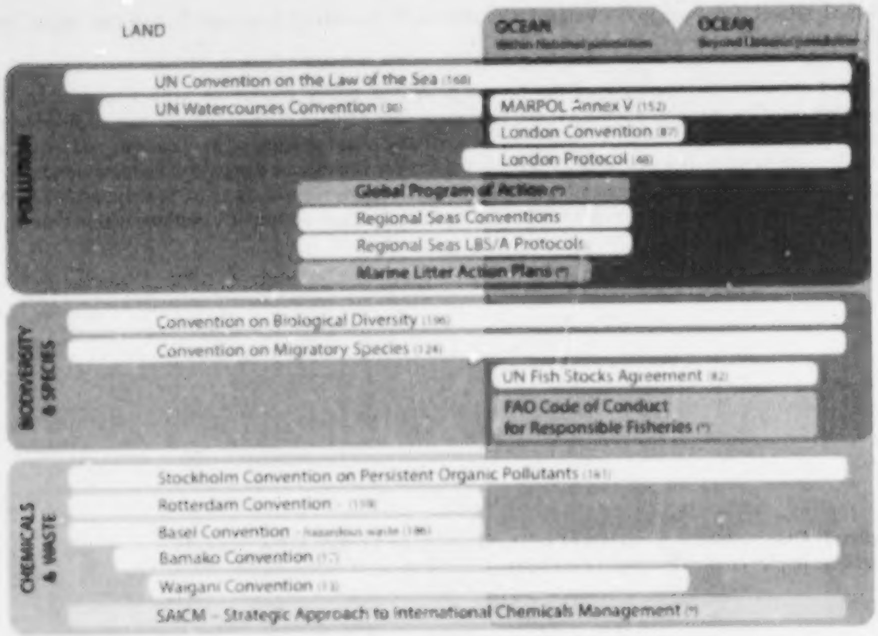
[31] *Basel Convention On The Control Of Transboundary Movements Of Hazardous Wastes And Their Disposal*, opened for signature 22 March 1989, 1673 UNTS 57 (entered into force 5 May 1992) (*'Basel Convention'*) <http://www.basel.int/Portals/4/Basel%20Convention/docs/text/BaselConventionText-e.pdf>.

[32] *The Convention to Ban the importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement of Hazardous wastes within the South Pacific Region*, opened for signature 16 September 1995, 1857 UNTS 91 (entered into force 21st October 2001) (*'Waigani Convention'*) <http://www.sprep.org/legal/the-convention-waigani>.

[33] *Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa*, opened for signature 30 January 1991, 2101 UNTS 211 (entered into force 22 April 1998) (*'Bamako Convention'*) <https://www.opcw.org/chemical-weapons-convention/related-international-agreements/toxic-chemicals-and-the-environment/bamako-convention/>.

[34] *Stockholm Convention on Persistent Organic Pollutants*, opened for signature 22 May 2001, 2256 UNTS 119 (entered into force 17 May 2004) (*'Stockholm Convention'*) <https://treaties.un.org/doc/Treaties/2001/05/20010522%2012-55%20PM/Ch_XXVII_15p.pdf>.


LAND
OCEAN
Within National jurisdiction
OCEAN
Beyond National jurisdiction
POLLUTION
UN Convention on the Law of the Sea (168)
UN Watercourses Convention (36)
MARPOL Annex V (152)
London Convention (87)
London Protocol (48)
Global Program of Action (*)
Regional Seas Conventions
Regional Seas LBS/A Protocols
Marine Litter Action Plans (*)
BIODIVERSITY & SPECIES
Convention on Biological Diversity (196)
Convention on Migratory Species (126)
UN Fish Stocks Agreement (82)
FAO Code of Conduct for Responsible Fisheries (*)
CHEMICALS & WASTE
Stockholm Convention on Persistent Organic Pollutants (181)
Rotterdam Convention - (159)
Basel Convention - hazardous waste (186)
Bamako Convention (17)
Waigani Convention (13)
SAICM - Strategic Approach to International Chemicals Management (*)

The **United Nations Convention on the Law of the Sea** (UNCLOS) is a framework convention setting out the legal framework within which all activities in the oceans and seas must be carried out. In addition to the general obligation to protect and preserve the marine environment, it includes the obligation to take all measures necessary to prevent, reduce and control pollution of the marine environment from any source, including from land-based sources, from vessels and by dumping (articles 194, 207, 210, 211). These measures shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life (article 194(5)). UNCLOS also includes extensive provisions on enforcement in respect of the various pollution sources (articles 213-222), and provides for global and regional cooperation and coordination for the protection and preservation of the marine environment. UNCLOS applies broadly to both sources and activities of pollution.

2.1.1. Pollution oriented instruments

UNCLOS is the only global instrument that imposes a legally binding obligation upon States for the prevention, reduction and control of land-based sources of pollution (article 207). States are required to adopt laws and regulations to prevent, reduce and control pollution of the marine environment from land-based sources, taking into account internationally agreed rules, standards and recommended practices and procedures (article 207(1)). States are to endeavor to harmonize their policies at the appropriate regional level (article 207(3)) and, acting especially through competent international organizations or diplomatic conference, to endeavor to establish global and regional rules, standards and recommended practices and procedures to prevent, reduce and control pollution of the marine environment from land-based sources, taking into account characteristic regional features, the economic capacity of developing States and their need for economic development (article 207(4)). The scope of land-based sources under UNCLOS includes rivers, estuaries, pipelines and outfall structures (article 207(1)). The laws, regulations, measures, rules, standards and recommended practices and procedures to be established include those designed to minimize, to the fullest extent possible, the release of toxic, harmful or noxious substances, especially those which are persistent, into the marine environment (articles 194(3), 207(5)), which would include marine plastic litter and microplastics.

Similarly, States are required to adopt laws and regulations to prevent, reduce and control pollution of the marine environment by dumping and to endeavor to establish global and regional rules, standards and recommended practices and procedures to prevent, reduce and control such pollution (article 210).

States are also required to adopt laws and regulations for the prevention, reduction and control of pollution of the marine environment from vessels flying their flag or of their registry, and to establish international rules and standards to prevent, reduce and control pollution of the marine environment from vessels (article 211). These laws and regulations are to be no less effective than the global rules and standards in the case of dumping (article 210), and have to have the same effect as that of generally accepted international rules and standards in the case of pollution from vessels (article 211). These global rules and standards are those adopted in the context of the International Maritime Organization.[35]

Another pollution-oriented global instrument is the **International Convention for the Prevention of Pollution from Ships** ("MARPOL").[36] It is the principal convention of the International Maritime Organization (IMO), the United Nations specialized agency for international shipping to address ship-based sources of pollution. MARPOL is a key international instrument to address pollution of the marine environment from ships. Its overall obligation is to prevent pollution of the marine environment from the discharge of harmful substances or effluents containing such substances. The IMO has adopted six annexes to MARPOL that includes Annex V on the prevention of pollution by garbage from ships. As stated by the IMO, the "MARPOL Convention seeks to eliminate and reduce the amount of garbage being discharged into the sea from ships."[37] Unless provided otherwise, Annex V applies to all ships, that is "to all vessels of any type whatsoever operating in the marine environment, from merchant ships to fixed or floating platforms to non-commercial ships like pleasure crafts and yachts." This would include fishing vessels.

MARPOL Annex V is a significant instrument for addressing ship-based sources of marine litter, in particular plastics. Since its adoption in 1973, MARPOL Annex V prohibits the discharge of plastics. In response to resolution 60/30 of the UN General Assembly, which had invited the IMO to review MARPOL Annex V and to assess its effectiveness in addressing sea-based sources of marine litter, in 2011 the Marine Environment Protection Committee (MEPC) 62 revised Annex V (resolution MEPC.201(62)).[38] The revised Annex V generally prohibits the discharge of all garbage into the sea, except as provided otherwise in Regulations 4, 5, and 6 of the Annex (related to food waste, cargo residues, cleaning agents and additives and animal carcasses). Under the revised MARPOL Annex V, garbage includes *inter alia* all kinds domestic and operational waste, all plastics, cargo residues and fishing gear. Importantly, the discharge into the sea of all plastics, including but not limited to synthetic ropes, synthetic fishing nets, plastic garbage bags and incinerator ashes from plastic products, is prohibited, subject to the exception provided under Regulation 7. These include damage to the ship or its equipment, securing the safety of the ship or those on board or saving a life at sea, or preventing environmental damage from the loss of fishing gear. In all cases, all reasonable precautions must have been taken to prevent such loss. Moreover, if plastic is mixed with other garbage it must be treated as if it is all plastic and subject to the most stringent procedures for the handling and discharge (para. 2.4.6 of 2012 Guidelines *for the Implementation of Annex V*).

Regulation 10.2 of the revised MARPOL Annex V requires that every ship of 100 gross tonnage and above, and every ship which is certified to carry 15 or more persons and fixed or floating platforms must carry a Garbage Management Plan based on the 2012 *Guidelines for the Development of Garbage Management Plans*[39] (resolution MEPC.220(63)). According to the 2012 Guidelines, the garbage plan must provide written procedures for minimizing, collecting, storing, processing and disposing of garbage, including the use of the equipment on board and according to the standards provided in article 4 of Annex V. The Guidelines also refer to garbage management plans that are cost-effective and environmentally sound and employ a combination of complementary techniques, including reduction at source; reusing or recycling; onboard processing (treatment); and discharge to a port reception facility (Regulation 3.1). It should be noted that Regulation 8 of MARPOL Annex V requires Governments to provide adequate port reception facilities for garbage.

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[35] See International Maritime Organization (IMO), *Implications of the United Nations Convention on the Law of the Sea for the International Maritime Organization. Study by the Secretariat of the International Maritime Organization (IMO) LEG/MISC.8* (2014).

[36] *Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships of 2 November 1973, as amended*, opened for signature 17 February 1978, 1340 UNTS 184 (entered into force 2 October 1983) ('*MARPOL 73/78*') <https://treaties.un.org/doc/Publication/UNTS/Volume%201340/volume-1340-I-22484-English.pdf>.

[37] International Maritime Organization (IMO), *Prevention of Pollution by Garbage from Ships*, <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/Garbage/Pages/Default.aspx>, accessed 19 July 2017.

[38] Entered into force on 1 January 2013.

[39] International Maritime Organization (IMO), *2012 Guidelines for the Development of Garbage Management Plans*, MEPC.220(63), (Resolution MEPC.220(63)) http://www.imo.org/en/KnowledgeCentre/IndexofIMOResolutions/Marine-Environment-Protection-Committee-(MEPC)/Documents/MEPC.220(63).pdf>.

Regulations 7.1 and 10.3.2 of MARPOL Annex V require all ships that are 400 gross tonnage and over, and ships certified to carry 15 or more persons, and fixed or floating platforms to carry a *garbage record plan*. Ships over 400 gross tonnage are further required to have a Garbage Record Book or ship's log-book in accordance with the form specified under Annex V (Regulation 10.3.3). All discharges into the sea, or to reception facilities, or completed incinerations, as well as regulation 7 discharges or accidental losses are to be recorded in the Garbage Record Book or ship's log. In 2016 amendments were adopted that are to enter into force on 1 March 2018, for the Garbage Record Book to include e-waste. [Resolution MEPC.277(70) (Adopted on 28 October 2016)]. Fishing vessel operators are also required to record the discharge or loss of fishing gear in the Garbage Record Book or ship's log-book.

In 2012 the IMO adopted the Guidelines *for the Implementation of Annex V*.[40] The MARPOL Annex V Guidelines extend the application of waste minimization to ship-supplier relations in providing that "When requisitioning stores and provisions, shipping companies should encourage their suppliers to remove, reduce, all packaging, at an early stage, to limit the generation of garbage on board ships." The Guidelines include a provision that all ship owners and operators should minimize taking onboard material that could become garbage, in making supply and provisioning arrangements with suppliers, ship owners and operators should take into account the garbage that such products will generate and investigate options to decrease the amount of garbage. Such options include *inter alia* using supplies that come in bulk packaging; using supplies that come in reusable or recyclable packaging and containers; avoiding the use of disposable cups, utensils, dishes, towels and rags and other convenience items; and avoiding supplies that are packaged in plastic, unless a reusable or recyclable plastic is used. (para. 2.1.2). The Guidelines also encourage seafarers to recover persistent garbage from the sea during routine operations and retain the material for discharge to port reception facilities (para. 2.4.9).

Annex V has garnered broad support with a total of 152 governments, representing 99% of the world shipping tonnage, having ratified Annex V as of June 2017.[41]

An additional IMO global pollution-oriented instrument relevant to marine plastic litter and microplastics is the **Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter,** 1972 (London Convention) and the 1996 Protocol thereto (London Protocol).[42] These instruments apply to source reduction but only to dumping activities from vessels, aircraft, platforms or other man-made structures at sea directly into the marine environment by ships. The Contracting Parties are to *inter alia* "take all practicable steps to prevent the pollution of the sea by the dumping of waste and other matter that is liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea." (London Convention, article 1; London Protocol article 2) The 1996 Protocol extends this duty to the *elimination* of pollution of the sea caused by dumping or incineration at sea of wastes or other matter where practicable. Under the London Protocol there is a general prohibition on the dumping of any waste or other matter at sea, except for those wastes listed in Annex I (often referred to as "reverse-listing").

In 2015 an initial review was conducted on marine litter that may be found in various waste streams for which dumping is permitted under certain conditions as per the London Convention and the London

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[40] International Maritime Organization (IMO), *2012 Guidelines for the Implementation of MARPOL Annex V as set out in the Annex to Resolution MEPC.219(63)* (International Maritime Organisation, 2012).

[41] International Maritime Organization (IMO), *Status of Conventions*, <http://www.imo.org/en/About/Conventions/StatusOfConventions/Pages/Default.aspx>, accessed 23 September 2017.

[42] *Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972*, opened for signature 7 November 1996, 36 ILM 1 (1997) (entered into force 24 March 2006) (*'London Protocol'*) <http://www.austlii.edu.au/au/other/dfat/treaties/2006/11.html>.

Protocol (LC 31/INF.4). The final report[43] found that dredged material and sewage sludge are the waste streams most likely to contain microplastics with the occasional macroplastics, including fishing gear, found in dredged material. Importantly, the report recognized that current authorization procedures for these two waste streams do not specifically require analysis of the litter content (of which a high percentage is plastic) both within the waste or at the proposed dump site. The report suggested one of the focal areas of future studies be to develop and agree on standardized procedures for extracting, identifying and quantifying plastics in sludge and sediments" (p. 29). Parties to both instruments also adopted a statement to recommend and encourage action to combat marine litter (LC 38/16 Annex 8) with a focus on source-reduction.

The London Convention currently has 87 Parties, and the 1996 Protocol has only 49 Parties.

The Convention* on the Law of Non-Navigational Uses of International *Watercourses *(1997)* (International Watercourses Convention), which recently entered into force, applies "to uses of international watercourses and of their waters for non-navigational purposes." Parties using an international watercourse in their territories are required to "take all appropriate measures to prevent the causing of significant harm to other watercourse States" which includes the obligation to eliminate or mitigate such harm (article 1). Parties are also required to "prevent, reduce and control pollution" (article 21). This broad mandate would include marine plastic litter and microplastics although these are not expressly mentioned. Article 23 of the UN Watercourses Convention provides that watercourse States "shall take all measures with respect to an international watercourse that are necessary to protect to and preserve the marine environment." There are 36 Parties to the Convention.

Among the global pollution-oriented legally binding instruments, only UNCLOS has a broad mandate to address both activities and sources of pollution that would encompass the various sources of marine plastic litter and microplastics. However, the provisions of UNCLOS do not specify the types of measures necessary, leaving it for States to adopt the necessary national legislation and regulations, which, depending on the source of pollution, must either take into account internationally agreed rules, standards and recommended practices and procedures (e.g. laws and regulations relating to land-based pollution, article 207), be no less effective than the global rules and standards (e.g. laws and regulations relating to dumping, article 210) or have the same effect as that of generally accepted international rules and standards (e.g. laws and regulations relating to pollution from vessels, article 211). In the case of dumping and pollution from vessels, the global rules and standards are those adopted in the context of the IMO. The IMO instruments are limited to dumping and discharge activities from ships and do not apply to other activities or to land-based sources, such as addressing the production of plastics. The International Watercourses Convention could in theory have a broader inland scope of application to sources and activities; however, it was slow in coming into effect and still has a very low level of State participation.

2.1.2. **Biodiversity and species oriented instruments**

In addition to the pollution-oriented instruments there are also global instruments that focus on conservation. While these do not have a pollution prevention mandate, nevertheless they have indirectly addressed marine plastic litter and microplastics.

The **Convention on Biological Diversity** (CBD) is considered a universally accepted convention, having 196 Parties.[44] It principally applies to the conservation of biological diversity and does not directly address pollution of the marine environment. The Parties adopted specific Aichi Biodiversity Targets that addressed pollution as part of Strategic Goal B to reduce the direct pressures on biodiversity and promote sustainable use. Aichi Biodiversity Target 8 provides that by 2020 pollution is to be brought to levels that are not detrimental to ecosystem function and biodiversity. Aichi Biodiversity Target 10 provides for the minimization of the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification, so as to maintain their integrity and functioning, by 2015.

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[43] International Maritime Organization (IMO), *Review of the Current State of Knowledge Regarding Marine Litter in Wastes Dumped at Sea under the London Convention and Protocol - Final Report (LC 38/16)* (2016).

[44] CBD Secretariat, *List of Parties*, <https://www.cbd.int/information/parties.shtml>, accessed 15 July 2017.

Recognizing the threat posed by marine litter to various marine species, the State Parties adopted several relevant decisions.[45] In particular, COP XIII/10 provides voluntary practical guidance on preventing and mitigating the impacts of marine litter on marine and coastal biodiversity and habitats (Annex). The decision urges Parties, and encourages other Governments and relevant international organizations to develop and implement measures, policies and instruments to prevent the discard, disposal, loss or abandonment of any persistent, manufactured or processed solid material in the marine and coastal environment. The Decision includes voluntary guidance on "…preventing and mitigating the impacts of marine debris on marine and coastal biodiversity and habitats." Importantly and specifically, as part of the priority actions to be taken, the guidance calls for Parties to "[a]ssess whether different sources of microplastics and different products and processes that include both primary and secondary microplastics are covered by legislation, and strengthen, as appropriate, the existing legal framework so that the necessary measures are applied, including through regulatory and/or incentive measures to eliminate the production of microplastics that have adverse impacts on marine biodiversity."[46] Also, in relation to fishing activities, the guidance calls for the Parties to "[i]dentify options to address key waste items from the fishing industry and aquaculture that could contribute to marine debris, and implement activities, including pilot projects, as appropriate, and good practices, such as deposit schemes, voluntary agreements and end-of-life recovery, in collaboration with the Food and Agriculture Organization of the United Nations and the United Nations Environment Programme."[47] However, the decision is not legally binding.

UNCLOS, in addition to requiring States to take measures necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life (article 194), provides for coastal State regulation of fishing gear by providing for licensing of fishing equipment used in waters under national jurisdiction, including in the exclusive economic zone (article 62), and for the enforcement of such national regulation (article 73).

The **Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (United Nations Fish Stocks Agreement)** is concerned with the conservation and management of straddling fish stocks and highly migratory fish stocks in areas beyond national jurisdiction and under national jurisdiction. However, it also includes obligations for States to minimize pollution, waste, discards, and catch by lost or abandoned gear (article 5(f)). It provides that measures to be taken by a State in respect of vessels flying its flag shall include requirements for marking of fishing gear for identification in accordance with uniform and internationally recognizable vessel and gear marking systems (article 18(3)(d)). It has been ratified/acceded to by 85 States and the European Union, but may reach a broader range of States to the extent it is implemented through Regional Fisheries Bodies.

The principal mechanism for implementation of the United Nations Fish Stocks Agreement (UNFSA) is through the establishment of conservation and management measures by regional or sub-regional fisheries bodies. As explained in a recent FAO report, RFMOs have "… the competence to establish binding conservation and management measures. They provide a formal mechanism for fishing States and States in whose jurisdiction fishery resources occur to meet their international obligation to cooperate to sustainably govern shared living marine resources throughout their distributions."[48]

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[45] See CBD, *Marine and coastal biodiversity: sustainable fisheries and addressing adverse impacts of human activities, voluntary guidelines for environmental assessment, and marine spatial planning*, UNEP/CBD/COP/DEC/XI/18, 11, (CBD Decision XI/18) https://www.cbd.int/doc/decisions/cop-11/cop-11-dec-18-en.pdf>. and CBD, *Marine and coastal biodiversity: Impacts on marine and coastal biodiversity of anthropogenic underwater noise and ocean acidification, priority actions to achieve Aichi Biodiversity Target 10 for coral reefs and closely associated ecosystems, and marine spatial planning and training initiatives*, UNEP/CBD/COP/DEC/XII/23, 12, (Marine and coastal biodiversity: Impacts on marine and coastal biodiversity of anthropogenic underwater noise and ocean acidification, priority actions to achieve Aichi Biodiversity Target 10 for coral reefs and closely associated ecosystems, and marine spatial planning and training initiatives) https://www.cbd.int/doc/decisions/cop-12/cop-12-dec-23-en.pdf>..

[46] CBD, *Addressing impacts of marine debris and anthropogenic underwater noise on marine and coastal biodiversity*, CBD/COP/DEC/XIII/10, 13, (CBD Decision XIII/10) https://www.cbd.int/doc/decisions/cop-13/cop-13-dec-10-en.pdf>., Para. 8 (f)

[47] Ibid, Para. 9 (b)

Regional Fisheries Bodies have been in existence since well before the UNFSA was adopted. However, the UNFSA codified and further developed specific obligations for the conservation of highly migratory and straddling fish stocks. Importantly, the Fish Stocks Agreement covers areas of oceans that lie beyond national jurisdiction (high seas). However, the UNFSA does not cover all fish stocks and is therefore not comprehensive. Nevertheless, existing regional fisheries bodies, whose coverage of fish stocks species is not restricted by the Fish Stocks Agreement, cover a significant geographic marine area that includes the Antarctic region, the Bering Sea, the Mediterranean and Black Seas, the Western and Central Pacific Ocean, the South Pacific Ocean, the South Indian Ocean, Northeast Atlantic Ocean, Northwest Atlantic Ocean and Southeast Atlantic (see Figure 2). Several of these regional fisheries bodies are limited to specific species of fish stocks such as tuna, pollock, halibut and salmon. These RFMOs provide an important legal mechanism for States to adopt measures to address abandoned, lost or otherwise discarded fishing gear (ALDFG), an important source of marine plastic litter and microplastics.

Table 1: Regional Fisheries Bodies

1. International Commission for the Conservation of Atlantic Tunas (ICCAT)
2. Indian Ocean Tuna Commission (IOTC)
3. International Pacific Halibut Commission (IPHC)
4. Western and Central Pacific Fisheries Commission (WCPFC)
5. Inter-American Tropical Tuna Commission (IATTC)
6. Agreement on the International Dolphin Conservation Programme (AIDCP) (sister organization to IATTC)
7. Commission for the Conservation of Southern Bluefin Tuna (CCSBT)
8. North-East Atlantic Fisheries Commission (NEAFC)
9. Northwest Atlantic Fisheries Organization (NAFO)
10. North Atlantic Salmon Conservation Organization (NASCO)
11. South-East Atlantic Fisheries Organisation (SEAFO)
12. Southern Indian Ocean Fisheries Agreement (SIOFA)
13. South Pacific Regional Fisheries Management Organisation (SPRFMO)
14. Commission for the Convention on Conservation of Antarctic Marine Living Resources (CCAMLR)
15. General Fisheries Commission for the Mediterranean (GFCM)
16. Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea (CCBSP)
17. Subregional Fisheries Commission (SRFC)
18. Joint Norwegian-Russian Fisheries Commission (JNRFC)

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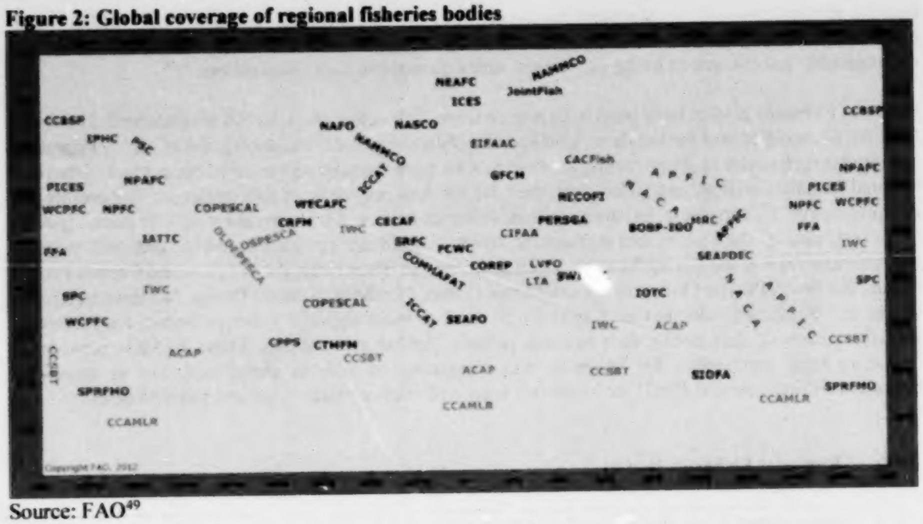
[48] Gilman, E. et al, 'Abandoned, lost or otherwise discarded gillnets and trammel nets' (2016) (600) *FAO Fisheries & Aquaculture Technical Paper* i-39..

Figure 2: Global coverage of regional fisheries bodies


NAMMCO
NEAFC
JointFish
ICES
CCBSP
NAFO
NASCO
IPHC
PSC
NAMMCO
EIFAAC
CACFish
ICCAT
GFCM
NPAFC
APFIC
PICES
NPAFC
RECOFI
RACA
PICES
WCPFC
NPFC
COPESCAL
WECAFC
NPFC
WCPFC
CRFM
IWC
CECAF
PERSGA
BOBP-IGO
MRC
APFIC
FFA
IATTC
OLDEPESCA
OSPESCA
CIFAA
SRFC
FCWC
SEAFDEC
IWC
FFA
COMHAFAT
COREP
LVFO
LTA
SWIOFC
SPC
SPC
IWC
IOTC
COPESCAL
ICCAT
SEAFO
WCPFC
IWC
ACAP
RACA
APFIC
CCSBT
CPPS
CTMFM
ACAP
CCSBT
CCSBT
ACAP
CCSBT
SIOFA
SPRFMO
SPRFMO
CCAMLR
CCAMLR
CCAMLR
Copyright FAO, 2012

Source: FAO[49]

According to the Food and Agricultural Organization (FAO) and UN Environment three types of measures are necessary to address ALDFG: mitigation, preventive and curative.[50] Preventive measures, which are considered to be the most effective, include gear markings, onboard technology to avoid loss or improve location of gear, provision of adequate and affordable port reception or collection facilities. A recent study conducted by FAO examined ten RFMO/As that employed active gillnets or trammel net fisheries with explicit mandates to monitor and/or control ALDFG.[51] The study showed that the vast majority lacked such mandates in their constituent instruments.[52] However, many RFMOs have adopted some measures addressing ALDFG such as *inter alia*, prohibition of the use of certain gear and/or gear marking requirements. RFMOs that have adopted such measures include CCAMLR, NASCO, NPAFC, IOTC, IATTC, ICCAT, WCPFC, GFCM, IPHC, JNRFC, NAFO, NEAFC, SEAFO, and SPRFMO.[53] In an effort to respond to the need for strengthened regulation of ALDFG, the FAO convened an expert consultation to prepare the *Draft guidelines on the markings of fishing gear* in 2016, which were endorsed by the thirty-second session of the Committee on Fisheries (2016) and the Committee supported the proposed technical consultation to further develop the guidelines on marking of fishing gear.[54]

The **Convention on the Conservation of Migratory Species of Wild Animals** (CMS) applies to migratory species in general, with 124 State Parties. The CMS seeks to conserve migratory species by ensuring that Contracting Parties take the necessary action, individually and collectively, to avoid species becoming endangered. The CMS requires "Range States" to adopt either individually or in co-operation with other States necessary conservation measures for such species, especially those whose conservation status is unfavorable.

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[49] Food and Agriculture Organization of the United Nations (FAO), *Regional Fishery Bodies (RFB)*, <http://www.fao.org/fishery/rfb/en>, accessed 12 August 2017.

[50] Macfadyen, G. et al, 'Abandoned, lost or otherwise discarded fishing gear' in (UNEP Regional Seas Reports and Studies, No. 185; FAO Fisheries and Aquaculture Technical Paper, No. 523, Rome, UNEP/FAO, 2009)

[51] See Table 1 in Gilman, E. et al, above n 48. Those regional fisheries bodies excluded from the study were: CCAMLR, CCSBT, IATTC, IPHC, IWC, NAFO, NEAFC, SEAFO and SPRFMO

[52] Ibid. at 39-53.

[53] For a very detailed assessment of nineteen fisheries bodies see Gilman, E., 'Status of international monitoring and management of abandoned, lost and discarded fishing gear and ghost fishing' (2015) 60 *Marine Policy* 225-239. The listed RFMOs are based on the information provided in Table 3 of Gilman's assessment.

[54] FAO, *Report of the Expert consultation on the Marking of Fishing Gear*, FAO Fisheries and Aquaculture Report No. 1157 (Food and Agriculture Organization of the United Nations, 2017).; Food and Agriculture Organization of the United Nations (FAO), *Report of the Thirty-second Session of the Committee on Fisheries. Rome (11–15 July 2016). FAO Fisheries and Aquaculture Report No. 1167* (2017).

In relation to marine litter, the Parties have adopted two resolutions (Res.10.4 and Res.11.30), that encourage or recommend specific measures for Parties to adopt to address knowledge gaps especially relating to the impacts of debris on marine species, best practice on commercial vessels, and awareness campaigns. In addition, three related reports were published in 2014 (UNEP/CMS/COP11/Inf.27, Inf.28 and Inf.29). The Parties have also adopted actions plans to address impacts from marine litter for specific marine species, namely for the Loggerhead Turtle (*Caretta caretta*) in the Pacific and for whales and dolphins. These conservation instruments do not address marine plastic litter and microplastics comprehensively, but at best provide supplementary measures for specific species. A comprehensive updated resolution on Management of Marine Debris is being considered for adoption at the 12th Meeting of the Conference of the Parties (COP12) in the Philippines in October 2017. Furthermore, several of the legally-binding agreements (e.g. ACAP, ACCOBAMS, ASCOBANS), non-binding Memoranda of Understanding (e.g. on marine turtles, cetaceans) and action plans concluded under the auspices of CMS address marine plastic litter and microplastics by suggesting measures of highest priority for migratory marine species.

Resolutions 4.5 and 10.4 also instructed the Scientific Council to recommend solutions to problems relating to the scientific aspects of the implementation of the Convention in particular with regard to the habitats of migratory species. The Convention's report on "Migratory Species, Marine Debris and its Management" revealed the impact of marine pollution on migratory species. Parties are encouraged to implement monitoring processes in order to assess the cumulative environmental impacts of pollution on migratory species.

In addition, the Strategic Plan for Migratory Species 2015-2023 includes Goal 1 (Address the underlying causes of decline of migratory species by mainstreaming relevant conservation and sustainable use priorities across government and society). In reaching this goal, Target 7 seeks to reduce the multiple anthropogenic pressures "to levels that are not detrimental to the conservation of migratory species or to the functioning, integrity, ecological connectivity and resilience of their habitats." The Strategic plan included marine litter among the multiple anthropogenic pressures.

It should be noted that the resolutions and Strategic Plan as instruments are hortatory and do not impose legally binding obligations on the State Parties.

Among these conventions the **Convention on Biological Diversity** theoretically could include broader legally binding measures that could extend to sources of marine plastic litter and microplastics, but only to the extent that such measures conserve biodiversity. While COP Decision XIII/10 focuses on prevention of activities related to discard, disposal, loss or abandonment of what could include marine plastic litter and microplastics, it also addresses controlling land-based and sea-based sources. Furthermore, the voluntary guidance also addresses production and design issues. [55] However, these are not legally binding instruments.

The United Nations Fish Stocks Agreement and the CMS by the nature of their mandates have limited scope to address marine plastic litter and microplastics at their sources.

2.1.3. Chemicals and waste oriented instruments

There are two principal global legally binding instruments relevant to the chemical additives within marine plastic litter and microplastics and their wastes. These are the **Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal** (Basel Convention), which has 186 Parties,[56] and the **Stockholm Convention on Persistent Organic Pollutants** (Stockholm Convention), which has 181 Parties.[57] The Basel Convention applies to the transboundary movements, including by sea, of hazardous wastes and so-called "other wastes"[58], which includes plastics. Each Party to the Basel Convention is required to take the appropriate measures to ensure that persons involved in the management of hazardous wastes or other wastes take such steps as are necessary to prevent pollution due to hazardous wastes and other wastes arising from such management and, if such pollution occurs, to minimize the consequences thereof for human health and the environment (article 4.2(c)). Parties are also required to review periodically the possibilities for the reduction of the amount and/or the pollution potential of hazardous wastes and other wastes that are exported to other States, in particular to developing countries.

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[55] CBD Decision XIII/10., Para. 8(b) and 8(d)(i).

[56] The European Union is Party to both the Basel and Stockholm Conventions.

[57] 2001 Stockholm Convention.; Secretariat of the Stockholm Convention, *Status of ratification*, <http://chm.pops.int/Countries/StatusofRatifications/tabid/252/language/en-US/Default.aspx>, accessed 15 July 2017.

Under the **Basel Convention** the transboundary movement of hazardous wastes and other wastes is to be reduced to a minimum, managed in an environmentally sound manner, treated and disposed of as close as possible to their source of generation, and minimized at its source. Although the Basel Convention addresses the export and import of hazardous and other wastes through shipment at sea it also addresses land-based and other sources of pollution within areas of jurisdiction by requiring Parties to ensure a minimum generation of hazardous wastes and other wastes (article 2.a) and to ensure the availability of adequate disposal facilities for the environmentally sound management of hazardous wastes and other wastes (article 2.h).

In relation to plastics, the Parties to the Basel Convention adopted the Technical Guidelines for the Identification and Environmentally Sound Management of Plastic Wastes and for their Disposal (COP 6, 2002). The Guidelines were deliberately extended to include all polymer and plastic types, not just those having an Annex I constituent (Y1 to Y45).[59] Pursuant to these guidelines, the elements most commonly found in plastics are carbon, hydrogen, nitrogen, oxygen, chlorine, fluorine and bromine, some of these elements being part of compounds that have been identified as being hazardous and can be incorporated into an organic polymer. Also, some additives or plastics/polymers appear among the material types that are listed in the Annex I to the Convention.

At their thirteenth meeting in May 2017, the Parties to the Convention adopted two decisions with express reference to marine plastic litter and microplastics, including the mandate to consider relevant options available under the Convention to further address marine plastic litter and microplastics.[60] A Partnership on Household Waste was established (decision BC-13/14), through which the environmentally sound management of household wastes including plastics will be further explored. Guidance to assist Parties in developing efficient strategies for achieving the prevention and minimization of the generation of hazardous and other wastes and their disposal was adopted, in which plastic waste was highlighted as an emerging waste stream. The regional and coordinating centres of the Convention were encouraged to work on the impact of plastic waste, marine plastic litter, microplastics, and measures for prevention and environmentally sound management.

The **Stockholm Convention** aims to protect human health and the environment from persistent organic pollutants by requiring Parties to restrict, prohibit or eliminate intentional production and use of chemicals listed in Annex A and B and to reduce or eliminate releases from unintentional production of chemicals listed in Annex C to the Convention. The Convention also provides for measures to reduce or eliminate releases from stockpiles and wastes containing POPs. The chemicals listed under the Stockholm Convention relevant to plastics include 1) polychlorinated biphenyls (PCBs)[61], which are often detected in marine plastic litter at a high concentration due to the adhesive property of plastics, 2) brominated diphenyl ethers (commercial pentaBDE and commercial octaBDE)[62] used as flame retardant in plastics and 3) perfluorooctane sulfonic acid (PFOS),[63] used as an additive in plastics. According to article 6 of the Convention, recovery, recycling, reclamation, direct reuse or alternative uses of POPs are not permitted. However, the BDEs are listed in Annex A with specific exemptions which allow registered Parties to continue recycling of articles that contain or may contain those chemicals, including in plastics, until 2030. During the recent Conference of the Parties on the Stockholm Convention,[64] Parties noted that BDEs have been detected in a range of articles in use, including in plastic toys that are not subject to flammability requirements, which suggests that their presence was unintentional and possibly a consequence of the recycling of plastics containing BDEs. Parties were urged to ensure that BDEs are not introduced into articles in which the presence of these chemicals would pose a risk of human exposure, in particular consumer products such as children's toys. The Conference of the Parties added decabromodiphenyl ether (commercial decaBDE)[65] and short-chain chlorinated paraffins (SCCPs) to the list of chemicals in Annex A.[66]

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[58] "Other wastes" are wastes collected from households and residues arising from the incineration of household wastes.

[59] Secretariat of the Basel Convention, *Technical guidelines for the identification and environmentally sound management of plastic wastes and for their disposal (UNEP/CHW.6/21)* (United Nations Environment Programme, 2002).

[60] See Secretariat of the Basel Convention, *Matters related to the implementation of the Convention: technical assistance: Basel Convention regional and coordinating centres*, UNEP/CHW.13/11, (UNEP/CHW.13/11) http://www.brsmeas.org/2017COPs/MeetingDocuments.aspx>. and decision BC-13/17 on the work programme of the Open-ended Working Group.

[61] Listed in Annex A to the Stockholm Convention with specific exemptions and in Annex C.

[62] Listed in Annex A to the Stockholm Convention with specific exemptions.

The chemical and wastes conventions only provide limited regulation of the production and use of plastics, and extend to the disposal of all types of plastics whether "hazardous" or not. The scope of the Stockholm Convention is limited to those POPs produced and used in the production of certain plastics. The Basel Convention has a broader scope than the Stockholm Convention in terms of addressing the management and disposal of hazardous wastes and other wastes and, as will be discussed below, its scope does not extend to all polymer and plastic types. Its contribution to addressing issues pertaining to marine plastic litter and microplastics is currently being explored by the Parties.

At the regional level, two instruments have been adopted with regards hazardous wastes. These are the Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (Bamako Convention) (1991) and the Convention to Ban the importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement of Hazardous wastes within the South Pacific Region (Waigaini Convention) (1995).

The **Bamako Convention** represents a regional agreement concluded pursuant to article 11 of the Basel Convention. It seeks to reduce and eliminate transboundary movements of hazardous waste, to minimize the production of hazardous and toxic wastes in Africa and contribute to the implementation of the Basel Convention in Africa. Parties shall ensure, to the extent possible, the necessary facilities are available for the environmentally sound management of hazardous wastes within their jurisdictions (article 4.3(d)). It also covers more wastes than the Basel Convention, such as radioactive wastes but also any waste with a listed hazardous characteristic or a constituent listed as a hazardous waste. Furthermore, any transboundary transport of hazardous wastes as provided for in article 9 of the Convention is deemed to be "illegal traffic." Plastics do not fall under the definition of hazardous wastes under Article 2. However, pursuant to article 3 parties may adopt national legislation to include as hazardous wastes substances not listed under Annex I of the Convention.

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[63] Listed in Annex B to the Stockholm Convention with acceptable purposes and specific exemptions.

[64] The thirteenth meeting of the Conference of Parties to the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal (BC COP13), the eighth meeting of the Conference of Parties to the Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (RC COP8), and the eighth meeting of the Conference of the Parties to the Stockholm Convention on Persistent Organic Pollutants (POPs) (SC COP8) convened from 24 April - 5 May in Geneva, Switzerland

[65] It is an intentionally produced chemical used as an additive flame retardant including in plastics, textiles, adhesives, sealants, coatings and inks. See Secretariats of the Basel, R. a. S. C., *#DETOX Outcomes: Additional chemicals listed, new partnership on household waste established, mandate given to tackle marine plastics*, <http://www.brsmeas.org/Implementation/MediaResources/PressReleases/DETOXOutcomes/tabid/5921/language/en-US/Default.aspx>, accessed 21 July 2017.

[66] SCCPs are used as lubricants and coolants in metal cutting and metal forming operations and as secondary plasticizers and flame retardants in plastics. (see https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/short-chain-chlorinated-paraffins)

The **Waigani Convention**, like the Bamako Convention, represents a regional agreement concluded pursuant to article 11 of the Basel Convention. And it also seeks to reduce and eliminate transboundary movements of hazardous and radioactive waste, and to minimize the production of hazardous and toxic wastes in the Pacific region. It seeks to ensure that disposal of wastes in the Convention area is completed in an environmentally sound manner, and further that the generation of hazardous wastes is reduced to a minimum at its source. The Convention applies the strict controls of the Basel Convention to the South Pacific area, and ensures that hazardous waste cannot travel from New Zealand or Australia to another Pacific country, or to Antarctica. Similar to the Bamako Convention, plastics do not fall under the definition of hazardous wastes under Article 2. Only However, pursuant to article 3 parties may adopt national legislation to include as hazardous wastes substances not listed under Annex I of the Convention.

2.2. Definition of pollution

An important criterion for determining whether an instrument is broad enough to encompass marine plastic litter and microplastics is the definition provided for "pollution" or whether the instrument expressly includes plastics or microplastics. As will be shown, while the pollution-oriented global instruments provide different definitions of "pollution," each definition is, nevertheless, broad enough to encompass marine plastic litter and microplastics.

UNCLOS defines pollution as "the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities". UNCLOS does not, however, provide any express reference to marine plastic litter or microplastics.

The **International Watercourses Convention** defines pollution as "any detrimental alteration in the composition or quality of the waters of an international watercourse which results directly or indirectly from human conduct." However, like UNCLOS it does not provide any express reference to marine plastic litter or microplastics.

Annex V of MARPOL does not provide a definition of pollution but does provide specific definitions of waste and plastic. Those relevant to plastics are cargo residues, domestic wastes, fishing gear, garbage (this definition includes fishing gear), incinerator ashes, operational wastes and plastic. As per the definition provided for plastic, "[f]or the purposes of this annex, "all plastics" means all garbage that consists of or includes plastic in any form, including synthetic ropes, synthetic fishing nets, plastic garbage bags and incinerator ashes from plastic products."[67] Furthermore, the 2012 Guidelines for the Implementation of MARPOL Annex V[68] (updated in 2017) include definitions for "recycling"[69] and "reuse".[70]

The **London Protocol** adopts similar wording for the definition of pollution (article 1.10) as for UNCLOS. This would indirectly include marine plastic litter and microplastics and makes reference to the methods of introduction to the marine environment. The act of dumping is further defined as per the Protocol (article 14).

The **Convention on Biological Diversity** does not include a definition of pollution. However, COP Decision XIII/10 states that "[m]arine debris is usually defined as any persistent, manufactured or processed solid material discarded, disposed of, lost or abandoned in the marine and coastal environment."

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[67] Regulation 1(13).

[68] International Maritime Organization (IMO), above n 40.

[69] Para. 1.6.3 Defined as "the activity of segregating and recovering components and materials for reprocessing."

[70] Para. 1.6.4 Defined as "the activity of recovering components and materials for further use without reprocessing."

The **Convention on Migratory Species** does not define pollution but in resolution 10.4, marine debris is considered "to include any anthropogenic, manufactured or processed solid material, irrespective of its size, discarded, disposed of or abandoned in the environment, including all materials discarded into the sea, on the shore, or brought indirectly to the sea by rivers, sewage, storm water or winds". This very clearly includes marine plastic litter and microplastics.

The **Basel Convention** does not provide for a definition of pollution but rather addresses "wastes" defined in article 2(1) as "substances or objects, which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law." As mentioned previously, plastic wastes may fall within the scope of the Convention if they are "hazardous" or "other wastes". To amount to a hazardous waste, the waste must fall within one of the categories of wastes listed in Annex 1, which lists both a variety of wastes streams and waste constituents, and possess any of the hazardous characteristics listed in Annex III (e.g. toxic). Annexes VIII and IX further refine the lists of hazardous wastes covered by the Convention, with the latter expressly listing some plastic wastes that are presumed to be non-hazardous unless established otherwise. Plastics also fall within the scope of the Convention if they are "other wastes" namely wastes collected from households or residues arising from the incineration of household wastes.

The **Stockholm Convention** does not provide a definition of pollution, but provides the criteria to be met in order for a chemical to be listed as a persistent organic pollutant. These criteria include persistence, bio-accumulation, potential for long-range environmental transport and adverse effects (Annex D).

2.3. Applicable principles

Principles are important in guiding the application of legal instruments. There are many different environmental principles. However, for the purpose of this study key principles relevant to addressing marine plastic litter and microplastics are: the precautionary principle/approach, duty to cooperate, the principle of prevention (transboundary pollution prevention), the polluter pays principle, integrated coastal management, best available science (BAS), best available techniques (BAT), best environmental practice (BEP), most appropriate technology (MAT), best available technology (BAT), and use of environmental impact assessments (EIA).

The precautionary approach as adopted under Rio Principle 15 states that "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." This is an important principle for decision-makers of particular significance to the production, use and disposal of marine plastic litter and microplastics.

The general principle of cooperation is a recognized fundamental principle of international law and is a rule of customary international law. It can be found in many major international instruments and MEAs. As a principle, it has been applied to a range of matters including scientific and technical cooperation, capacity building and more. The formulation in Rio Principle 7 requires inter alia "global cooperation to conserve, protect and restore the health and integrity of the Earth's ecosystem." Cooperation among States is clearly an integral part of addressing marine plastic litter and microplastics, which is a transboundary problem. The duty to cooperate is also a central feature of UNCLOS.

The principle of prevention is found in Rio Principle 2, which provides that States have the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or to areas beyond the limits of national jurisdiction. Rio Principle 19 also requires that "States provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith." This principle is closely linked to the duty to cooperate but places an additional responsibility on States to provide notice to other States in cases of possible transboundary harm, such as pollution.

Principle 17 of the Stockholm Declaration calls for States to conduct environmental assessments at the national level for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority. International courts and tribunals have recognized the principle as an obligation under international law for transboundary shared resources.[71] The question is how this principle will apply in relation to the production, use and disposal of plastics in light of our current knowledge of its impact on the marine environment.

The polluter pays principle, which dates back to the OECD recommendations in the 1970s, is based on the premise that the costs of preventing, controlling and remedying any pollution is to be borne by the polluter. Rio Principle 16 provides that national authorities are to endeavor "to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment." This is an important principle for marine plastic litter and microplastics in determining the financial responsibilities for addressing marine and coastal pollution caused by marine plastic litter and microplastics.

Integrated coastal management was introduced in Agenda 21, Chapter 17 during the United Nations Conference on the Environment and Development. The European Union has explained that "integrated coastal management aims for the coordinated application of the different policies affecting the coastal zone and related to activities…" that would include both upstream and downstream activities concerning marine litter and plastics.[72]

A review of the global instruments considered below and in Table 2 reveals an uneven application of these principles among them. Specifically, the *precautionary approach/principle* is found in the CBD (Preamble and Decision II/X), the UNFSA (article 6), the 1996 London Protocol (article 3), the Stockholm Convention (article 8), the Waigani Convention (article 1).

The principle to *prevent transboundary pollution or environmental harm* is found directly in UNCLOS (article 194(2)), indirectly in the United Nations Fish Stocks Agreement and CBD (Ecosystem Approach (Decision V/6) as well as taken into account in CMS for assessing the conservation status of species (article 1). While not identified as a principle, prevention of transboundary pollution from hazardous wastes is a key objective of the Waigani Convention and Bamako Convention. Environmental impact assessments are required under UNCLOS (articles 204 to 206), CBD, 1996 London Protocol (Annex 2) and the International Watercourses Convention (article 12).

Among the global instruments examined the use of *best scientific evidence* or information is found in UNCLOS (article 234), the CMS (article III (3)) and the UNFSA (articles 5(b), 6(3)(a), 6(3)(b), 6(7), 10(f) and 16(1)). The Stockholm Convention includes *best available techniques* (article 5(d)(e)) and *best environmental practice* (article 5(e)). UNCLOS refers to best practical means (article 194(1)). The use of *clean production technology* is found in the 1996 London Protocol, CBD, CMS, the Waigani and Bamako Conventions. It should be noted that there is no mention of the *integrated coastal management* in any of these instruments. However, UNCLOS recognizes that the problems of ocean space are closely interrelated and need to be considered as a whole (preamble). Furthermore, the CBD has adopted several decisions promoting the adoption of integrated marine and coastal management (eg COP Dec. VII/5).

There are a number of principles specifically relevant for marine debris/litter that are found only in global and regional action plans and not in the main binding global instruments. These include sustainable consumption and production, best available knowledge and socio-economic effectiveness; Integration of Reduce, Reuse, Recycle, Return (3R + Return); Product stewardship; Proximity principle and Transparency.

Table 2: Summary of principles in current conventions

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[71] Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, I.C.J. Reports 2010, p. 14; *Responsibilities and obligations of States sponsoring persons and entities with respect to activities in the Area, ITLOS Seabed Chambers,* Advisory Opinion 1 February 2011; Construction of a Road in Costa Rica Along the San Juan River (Nicaragua v. Costa Rica), Judgment [Merit] 16 December 2015

[72] See European Commission, *Integrated Coastal Management*, <http://ec.europa.eu/environment/iczm/index_en.htm>, accessed 12 June 2017.

Global and regional instruments*	**Precaution**	**Polluter Pays**	**Best Available Technique**	**Best Available Technology**	**Most Appropriate Technology**	**Clean Production Technologies**	**Best Environmental Practice**	**Environmental Impact Assessment**
UNCLOS		x						x
MARPOL		x	x	x			x	x
London Convention		x	x				x	x
London Protocol	x	x	x			x		x
UNFSA	x							
CBD				x		x	x	x
CMS			x			x	x	x
Basel Convention					x		x	x
Stockholm Convention	x		x	x	x		x	x
Waigani Convention	x					x		
Bamako Convention	x					x		

* x: the principle is explicitly incorporated in the text of the instrument

2.4. Measures of implementation

In order to attain its objective, an environmental instrument will require that States adopt certain measures of implementation. For pollutants, such measures can include the phase-out of substances based on timetables or targets, the discharge of substances through permits or prohibitions based on listing methods or setting value limits.

At the global level, while UNCLOS provides the general obligation to adopt laws and regulations in respect of the various sources of pollution, it does not specify the content of the measures that are to be taken to address the different sources of pollution, other than indicating that the measures shall include those designed to minimize to the fullest possible extent, inter alia, the release of toxic, harmful or noxious substances, especially those which are persistent, from land-based sources, from or through the atmosphere or by dumping (article 194(3)). UNCLOS refers instead to the relevant international rules, standards and recommended practices and procedures, which States are obligated to endeavor to establish, acting either independently or through competent international organizations or diplomatic conference.

The London Convention and its 1996 Protocol specifically apply the listing method and impose prohibitions or restrictions on the dumping of wastes at sea. In the case of the London Convention, depending on which annex is applicable, States must either prohibit or subject the dumping activity to a permit system. The 1996 London Protocol applies the more restrictive "reverse listing system" where the dumping of all wastes is prohibited unless expressly permitted as per the annex to the Protocol.

In regard to "garbage management" Annex V of MARPOL and the associated Guidelines adopt the "waste minimization" approach. Ship owners and operators are to minimize taking onboard material that could become garbage. Procedures should be detailed in the Garbage Management Plan. The guidelines for implementation of Annex V recommend that manufacturers, cargo owners, ports and terminals, ship owners and operators and governments consider the management of garbage associated with ships' supplies, provisions, and cargoes as needed to minimize the generation of garbage in all forms.

Under the International Watercourse Convention mutually agreeable measures and methods can be adopted, such as setting joint water quality objectives and criteria; establishing techniques and practices to address pollution from point and non-point sources; and establishing lists of substances the introduction of which into the waters of an international watercourse is to be prohibited, limited, investigated or monitored (article 21).

National Biodiversity Strategies and Action Plans (NBSAPs) are the main means of implementation of the CBD as provided for in article 6 of the Convention.[73] In addition, COP XIII/10, as adopted by the CBD, includes voluntary guidelines for inter alia preventing and mitigating the impacts of marine litter on marine and coastal biodiversity and habitats. The Guidelines call for a focus on prevention of the discard, disposal, loss or abandonment of any persistent manufactured or processed solid material in the upstream and marine and coastal environment. Furthermore, mitigation measures are also recommended against the significant adverse impacts of marine litter and provide a number of "priority actions" for land-based sources. Economic incentives are also included among the approaches to prevent marine pollution from marine litter, such as levies for the sale of plastic bags and/or banning single-use plastic bags, in particular for coastal communities and coastal tourist resorts.

The Convention on Migratory Species has progressively addressed marine litter through resolutions (10.4 and 11.30), MOUs for specific species and the expanded Strategic Plan for Migratory Species (2015-2023). The Strategic Plan includes five goals and specific targets for each goal.

The Basel Convention requires Parties to adopt legislation and other measures to implement its provisions, for instance waste management measures that include *inter alia* ensuring the availability of adequate disposal facilities for the environmentally sound management of hazardous wastes and other wastes in the place of their disposal where possible. Detailed guidelines (Technical guidelines for the identification and environmentally sound management of plastic wastes and for their disposal) were also adopted, as well as for incineration,[74] landfilling,[75] waste pneumatic tyres,[76] and POPs.[77]

The Bamako and Waigani Conventions also include requirements for the Parties to adopt legislation and other measures to implement their provisions, as well to provide for adequate treatment and disposal facilities and the environmentally sound management of hazardous wastes. Necessary steps must be taken to prevent pollution arising from such wastes and to minimize the consequences of any pollution that does occur. However, the Waigani Convention further requires that the Parties in cooperation with the Secretariat,develop programmes to manage and simplify the transboundary movement of hazardous wastes that cannot be disposed of in an environmentally sound manner, and also develop national hazardous wastes management strategies that are compatible with the SPREP South Pacific Regional Pollution Prevention, Waste Minimization and Management Programme.

The Stockholm Convention requires that Parties develop an implementation plan for meeting their obligations under the Convention, and also develop appropriate strategies for identifying stockpiles consisting of chemicals or containing wastes listed in Annexes. Sites contaminated by such chemicals must also be identified.

Lack of a common method of implementation measures adopted by the different global instruments is not necessarily a gap so long as the measure of implementation attains the objective of the instrument. Nonetheless, certain measures may be more effective than others, and further examination is required to determine the more effective measure of implementation for marine plastic litter and microplastics.

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[73] As of July 2017, a total of 183 Parties out of 196 have submitted such NBSAPs. See CBD Secretariat, *National Biodiversity Strategies and Action Plans (NBSAPs)*, <https://www.cbd.int/nbsap/>, accessed 15 June 2017.

[74] Secretariat of the Basel Convention, *Technical Guidelines on Incineration on land,* Basel Convention series/SBC No. 02/04 (2002).

[75] Secretariat of the Basel Convention, *Technical Guidelines on Specially Engineered Landfill (D5),* Basel Convention series/SBC No. 02/03 (2002).

[76] Secretariat of the Basel Convention, *Revised technical guidelines for the environmentally sound management of used and waste pneumatic tyres,* UNEP/CHW.10/6/Add.1/Rev.1 (2011).

[77] Secretariat of the Basel Convention, *Technical guidelines on the environmentally sound management of wastes consisting of, containing or contaminated with hexabromodiphenyl ether and heptabromodiphenyl ether, or tetrabromodiphenyl ether and pentabromodiphenyl ether,* UNEP/CHW.12/5/Add.6/Rev.1 (2015).; Secretariat of the Basel Convention, *General technical guidelines on the environmentally sound management of wastes of wastes consisting of, containing or contaminated with persistent organic pollutants (UNEP/CHW.12/5/Add.2/Rev.1)* (2015).

2.4.1. Compliance and enforcement

Compliance and enforcement of multilateral environmental agreements (MEAs) is a key component for ensuring the effectiveness of these instruments to meet their objectives. UN Environment has defined compliance as "the fulfilment by the Contracting Parties of their obligations under a multilateral environmental agreement and any amendments to the multilateral environmental agreement".[78] The UN Environment Guidelines suggest different approaches that States may adopt as useful and appropriate for enhancing compliance with multilateral environmental agreements. These include (1) obligations of parties to multilateral environmental agreements should be stated clearly; (2) national implementation plans could be required in a multilateral environmental agreement (3) provisions in the MEA for reporting (to make regular, timely reporting on compliance, using an appropriate common format); monitoring (the collection of data and in accordance with the provisions of a multilateral environmental agreement can be used to assess compliance with an agreement, identify compliance problems and indicate solutions); and verification of the information obtained on compliance (verification of data and technical information usually through national reports); and (4) non-compliance mechanisms (establishment of a body, such as a compliance committee, to address compliance issues). Another important factor that can increase compliance by States with their obligations under a binding international instrument is strengthening capacity. Most global instruments include cooperation through capacity building.

2.4.1.1. Compliance mechanisms

The use of formal compliance mechanisms in multilateral environmental agreements is limited and the procedure varies. Some use compliance committees to both identify problems by States in fulfilling their legal obligations under an instrument and thereby promote compliance by States. Formal compliance processes can also include a punitive mechanism but this is not necessary.

UNCLOS does not have a formal compliance mechanism, but it does provide for compulsory procedures for dispute settlement, applicable to the provisions of the Convention relating to the protection and preservation of the marine environment. Furthermore, UNCLOS provides for specific enforcement rights and obligations at the national level for the different sources of pollution (Part XII, section 6, in particular articles 213, 216, 217, 218, 220).

There is no compliance mechanism for the London Convention, but the 1996 Protocol to the London Convention on dumping of wastes and other matter provides expressly for a compliance mechanism "…to assess and promote compliance with this Protocol." This facilitative mechanism was adopted in 2007[79] and the London Protocol Compliance Group, with representatives from all UN regions, meet annually in conjunction to the meeting of the governing bodies. The "Guidance on the National Implementation of the 1996 Protocol to the London Convention 1972" was adopted in 2001.

The Stockholm Convention requires development by the Parties of procedures and institutional mechanisms for determining non-compliance (article 17). However, to date the Parties have not adopted such a mechanism.

The Parties to the Basel Convention established the Mechanism for Promoting Implementation and Compliance with the Basel Convention (Decision VI/12).[80] The terms of reference for this mechanism are set out in the annex to the decision and a number of technical guidelines have been developed to assist Parties with implementation.

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[78] UNEP, *Guidelines on Compliance with and Enforcement of Multilateral Environmental Agreements* (2002). (para. 9). See also UNEP, *Compliance Mechanism under Selected Multilateral Environmental Agreements* (UNEP Division of Environmental Law and Conventions, 2012).

[79] International Maritime Organization (IMO), *Compliance Procedures and Mechanisms Pursuant to Article 11 of the 1996 Protocol to the London Convention 1972 (Adopted in 2007: LC 29/17, annex 7)*, LC 29/17, annex 7, (Compliance Procedures and Mechanisms Pursuant to Article 11 of the 1996 Protocol to the London Convention 1972 (Adopted in 2007: LC 29/17, annex 7)) http://www.imo.org/en/OurWork/Environment/LCLP/Compliance/Documents/Compliance%20Procedures.pdf>.

[80] Secretariat of the Basel Convention, *Compilation of Decisions. Decisions adopted by the Conference of the Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal: COP 6 - 10 and ExCOPs 1*, (Compilation of Decisions.

The United Nations Fish Stocks Agreement provides for a detailed compliance mechanism and process for States to ensure vessels flying under their flag comply with regional and sub-regional conservation and management measures for straddling fish stocks and highly migratory fish stocks (articles 18 and 19) and specific mention is made to fishing gear. There is also an express provision on international cooperation for enforcement (article 20). According to article 23 port States have the right to take measures to promote the effectiveness of sub-regional, regional and global conservation and management measures for highly migratory and straddling fish stocks covered under the Agreement. This would implicitly include compliance and enforcement measures. However, the United Nations Fish Stocks Agreement has limited scope of application and does not apply to all fish stocks.

Currently there is no formal compliance/enforcement procedure for MARPOL Annex V. However, the 2012 Guidelines for the Implementation of MARPOL Annex V includes a section on "Enhancement of Compliance with MARPOL Annex V" which recommends actions, such as use of compliance incentive systems, improving port reception facilities, strengthening local enforcement agencies, use of garbage management reporting systems that would include particular attention to inter alia loss of fishing gear.

It should be noted that port state control (PSC) can play an important role in complementing the role of flag States to ensure compliance with international rules and standards, including MARPOL requirements (e.g. regulation 9 of Annex V on PSC). Furthermore, the IMO has implemented a Mandatory State Audit Scheme (MSAS) that became effective as of 1 January 2016.[81] The MSAS will determine the extent to which flag States are implementing and enforcing their obligations under IMO Conventions, that includes MARPOL and its Annex V. The current scope of application of the MSAS does not include the 1996 London Convention or its 1996 Protocol, both of which are important for the prevention of intentional disposal of plastics into the sea by shipping. Nonetheless, PSC and MSAS and the compulsory procedures for dispute settlement under UNCLOS demonstrate that compliance can be achieved through different methods beyond having a compliance mechanism directly under an instrument.

2.4.2. **National plans or strategies**

Implementation through the preparation by States of national plans or strategies is found in two of the global conventions examined. The Stockholm Convention requires States to develop implementation plans for their obligations under the Convention related to the reduction, restriction and elimination of chemicals listed in the applicable annexes (article 7). The Convention on Biological Diversity requires the Parties to develop national strategies, plans or programmes, however these are directed towards conservation and sustainable use of biodiversity and not marine plastic litter and microplastics (article 7). Nonetheless, such strategies could be developed to include measures for addressing marine plastic litter and microplastics. In addition, the voluntary practical guidance provided by decision XIII/10 of the CBD also constitutes a strategy for addressing marine plastics and microplastics.

2.4.3. **Monitoring and Reporting**

Several of the global instruments examined include reporting requirements for the Contracting Parties: the CBD (article 26), Stockholm Convention (article 15), Basel Convention (article 13), the London Protocol (article 9.4, 9.5), MARPOL Annex V (regulation 10.6), and UNFSA (article 18.3.e, article 5 of Annex 1). Reporting under MARPOL Annex V is limited to the discharge or accidental loss of fishing gear if it poses a significant threat to the marine environment or navigation. This must in all cases be

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Decisions adopted by the Conference of the Parties to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal: COP 6 - 10 and ExCOPs 1) http://www.basel.int/Portals/4/download.aspx?d=UNEP-CHW-COP-PUB-CompilationOfDecisions.English.pdf>. See also Decision BC-10/11

[81] International Maritime Organization (IMO), *Framework and Procedures for the IMO Member State Audit Scheme*, A 28/Res.1067 (2013).

reported to the flag State and only to the coastal State if the discharge or loss occurs within the jurisdiction of the coastal State (regulation 10.6).

Monitoring requirements are found in UNCLOS (article 204 and reporting of results Article 205), CBD (article 7), Stockholm Convention (article 15), and Basel Convention (article 10). Under the Stockholm Convention, Basel Convention, London Protocol and CBD, the reports are submitted by Parties to their respective Secretariats. Under UNCLOS, both in the case of results obtained from monitoring the risks or effects of pollution and from the assessment of potential effects of activities, States shall publish reports of the results or provide such reports to the competent international organizations, which should make them available to all States (articles 204 to 206). To date no procedure for implementation of article 204 has been adopted at the global level for such reporting by State Parties. The lack of a clear reporting mechanism under article 204 of UNCLOS can be viewed as a policy gap.

Also under UNCLOS, a State that has clear grounds to believe that proper jurisdiction and control with respect to a ship have not been exercised may report the facts to the flag State (article 94). Upon receiving such a report, the flag State shall investigate the matter and, if appropriate, take any action necessary to remedy the situation (article 94). In addition, in respect of enforcement measures concerning the protection and preservation of the marine environment, States shall promptly notify the flag State and any other State concerned of any measures taken against foreign vessels, and shall submit to the flag State all official reports concerning such measures. However, with respect to violations committed in the territorial sea, the foregoing obligations of the coastal State apply only to such measures as are taken in proceedings (article 231).

2.5. Global Strategies and soft instruments

A number of global non-binding instruments have been adopted to address land-based sources of pollution in general: the **Protection of the Marine Environment Against Pollution from Land-based Sources (Montreal Guidelines)**,[82] which was followed by the 1995 Washington Declaration, and then the **1995 Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)**, a non-binding instrument adopted in 1995 by 108 states and the European Commission.[83] The GPA provides an intergovernmental mechanism for addressing land-based sources of pollution. It provides States with guidelines to implement the commitments undertaken during the 1992 UNCED Conference and Agenda 21 for addressing land-based sources of pollution.[84] The GPA aims to promote a regional and cooperative approach to addressing land-based sources of marine pollution, especially through the Regional Seas Programmes. It recognizes UNCLOS as the primary legal basis under international law for the prevention of land-based sources of marine pollution.

The GPA adopts an integrated coastal management (ICM) framework and the ecosystem based approach, as well as the integrated coastal and river basin management approach (ICARM). It provides an outline for actions to be taken for land-based sources of marine pollution at three different levels: the national level,[85] the regional level through cooperative action,[86] and the international level. It provides for more accurate identification and assessment of the problems in a specific geographic area and the necessary priorities for action. At the national level, States are exhorted to implement the GPA objectives through development of national plans.

The GPA also highlights the importance of cooperation between land-locked river basin States linked to a marine region or sub-region. The GPA further recommends that in the development and implementation of regional programmes of action, consideration be given, inter alia, to steps towards harmonization of environmental and control standards for emissions discharges of pollutants, steps to protect critical habitats and endangered species, building capacity as well as contingency planning, monitoring and assessment (including environmentally sound technology assessment), and arrangements to ensure that decision-making at the regional level is based on an integrated planning and management approach adopted at the national level. Linkages should be established with regional or sub-regional fisheries arrangements, as well as other mechanisms dealing with conservation of marine species, to promote collaboration in the exchange of data and information and mutual reinforcement in the achievement of respective objectives.[87]

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[82] *Montreal Guidelines for the Protection of the Marine Environment against Pollution from Land-Based Sources*, Decision 13/18/II, (Montreal Guidelines for LBS) (24 May 1985) <http://www.unep.org/law/PDF/UNEPEnv-LawGuide&PrincN07.pdf>.

[83] GPA, *Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)*, UNEP(OCA)/LBA/IG.2/7, (GPA) (3 November 1995) <http://unep.org/gpa/>. UN Environment was assigned the Secretariat duties.

[84] Ibid, p. 14-15. On UNCED and land-based pollution, see Dahl, A. L., 'Land-based pollution and integrated coastal management' (1993) 17(6) (1993/11/01/) *Marine Policy* 561-572.

[85] GPA., Chapter II "Actions at the National Level."

[86] Ibid, Chapter III "Regional Cooperation."

The GPA identifies specific sources of land-based pollution for international cooperation including wastewater treatment, persistent organic pollutants, sewage, radioactive substances, heavy metals, oils (hydrocarbons), nutrients, sediments, litter and physical alteration and destruction of habitat.[88] The Manila Declaration on Furthering the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities ("Manila Declaration")[89] gave the mandate to the GPA to focus its work on nutrients, litter and wastewater as the three priority source categories for the GPA for the period 2012-2016. The Manila Declaration called for amongst other things the establishment of the Global Partnership on Marine Litter (GPML), which was subsequestly launched at the Rio +20 in Brazil in June 2012.

Mention should be made of other soft law instruments of relevance to marine plastic litter and microplastics. The **FAO Code of Conduct for Responsible Fisheries (Code of Conduct)**[90] is a voluntary instrument that seeks to provide the legal principles for responsible fishing and fisheries activities. The broad scope of the Code of Conduct includes the problem of abandoned, lost or otherwise discarded fishing gear (ALDFG). Specifically, the Code of Conduct provides for the development of selective and environmentally safe fishing gear and practice in order to maintain biodiversity and to conserve the population structure and aquatic ecosystems and protect fish quality. These measures should be accorded a priority when establishing conservation and management measures for fisheries. The Code of Conduct also promotes waste minimization (articles 6.6 and 8).

In 2015 the United Nations General Assembly adopted the **2030 Agenda for Sustainable Development**.[91] The 2030 Agenda adopted 17 sustainable development goals (SDG), which include SDG 14 to conserve and sustainably use the oceans, seas and marine resources. Each SDG includes targets. The 10 targets for the implementation of SDG 14 include the need to prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine litter and nutrient pollution. While the goals and targets are not legally binding, the impact of SDG 14 on actions and measures to be taken by States in their national planning to fulfill the goal and targets is important.

Furthermore, in the outcome document of the United Nations Conference to Support the Implementation of Sustainable Development Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development, "Our ocean, our future: call for action", States called upon all stakeholders to conserve and sustainably use the oceans, seas and marine resources by taking urgent action on inter alia reduction of marine pollution, particularly from land-based sources, including marine litter, plastics and microplastics. Proposed actions include the promotion of waste prevention and minimization, the improvement of mechanisms for environmentally sound waste management and the

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[87] Ibid, p. 19.

[88] Ibid, p. 84-149.

[89] Manila Declaration, *Manila Declaration on Furthering the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities*, UNEP/GPA/IGR.3/CRP.1/Rev.1, (Manila Declaration) (27 January 2012) <http://www.unep.org/regionalseas/globalmeetings/15/ManillaDeclarationnew.pdf>.

[90] *FAO Code of Conduct for Responsible Fisheries*, ('*Code of Conduct*') <http://www.fao.org/docrep/005/v9878e/v9878e00.HTM>.

[91] UNGA, *Transforming our world: the 2030 Agenda for Sustainable Development*, A/Res/70/1, (The 2030 Agenda) https://undocs.org/A/RES/70/1>.

implementation of long-term and robust strategies to reduce the use of plastics and microplastics, in particular plastic bags and single-use plastics.

A number of goals and targets were adopted related to hazardous chemicals and wastes. SDG 3[92] includes the target to substantially reduce the number of deaths and illnesses from inter alia hazardous chemicals (target 3.9). SDG 6[93] includes the target to improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally. SDG 12 seeks to achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment (target 12.4).

Another important soft law instrument of relevance to combatting the negative effects marine plastic litter and microplastics is the **Strategic Approach to International Chemicals Management (SAICM)**, adopted in 2006. It is a policy framework seeking to promote chemical safety.[94] Its objective is to achieve the sound management of chemicals throughout their life cycle so that by the year 2020, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health. It adopts a holistic approach with the broad inclusion of all relevant sectors and stakeholders.

The SAICM adopted a Global Plan of Action to achieve its objective. The approach of the Global Plan of Action is broad and sets out activities for achieving sound management of chemicals. These include persistent, bioaccumulative and toxic substances (PBTs), very persistent and very bioaccumulative substances. Specifically, Activity 54 provides for the promotion of the use of safe and effective alternatives, including non-chemical alternatives to organic chemicals that are highly toxic, persistent and bioaccumulate. However, the scope of the SAICM is broad and does not expressly address marine plastic litter or microplastics. Moreover, it is a voluntary instrument, nonetheless laying an important foundation for cooperative action at the global level with specific targets.

The 2012 **Honolulu Strategy: A Global Framework for Prevention and Management of Marine Debris (Honolulu Strategy)**[95] is a framework document, developed by the UN Environment and National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program, as an international effort to reduce the ecological, human health, and economic impacts of marine litter globally.[96] It is a voluntary framework strategy. The Honolulu Strategy is a planning tool for marine litter programs and projects, a common frame of reference for collaboration and sharing of best practices and lessons learned and a monitoring tool to measure progress across multiple programs and projects. It consists of three core goals, each with strategies to prevent, reduce and manage marine debris in a holistic manner:

- Goal A - Reduced amount and impact of land-based sources of marine debris introduced into the sea,

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[92] SDG 3 "Ensure healthy lives and promote well-being for all at all ages."

[93] SDG 6 "Ensure availability and sustainable management of water and sanitation for all."

[94] See United Nations Environment Programme, *Strategic Approach to International Chemicals Management. SAICM texts and resolutions of the International Conference on Chemicals Management* (2006).

[95] *The Honolulu Strategy, A Global Framework for Prevention and Management of Marine Debris*, 25 March 2011, (Honolulu Strategy) http://www.unep.org/gpa/documents/publications/honolulustrategy.pdf>.

[96] Fifth International Marine Debris Conference (5IMDC) held in Honolulu, Hawaii, 20-25 March 2011

- **Goal B - Reduced amount and impact of sea-based sources of marine debris, including solid waste; lost cargo; abandoned, lost or otherwise discarded fishing gear (ALDFG); and abandoned vessels, introduced into the sea, and**
- **Goal C - Reduced amount and impact of accumulated marine debris on shorelines, in benthic habitats, and in pelagic waters.**

Each goal includes a designated section on "Monitoring Indicators/Evaluating Strategy Effectiveness" to assist in monitoring and evaluating global progress on specific strategies at different levels of implementation. Annex 1 of the Honolulu Strategy includes a list of potential actions that can be implemented under each strategy.

The Honolulu Strategy highlights the need for research, assessment, and monitoring to evaluate the different impacts of marine litter and for the development of new technologies and methods for detecting and removing accumulations of marine litter. These include inter alia: production of truly biodegradable polymers that meet ASTM standards for biodegradation in the marine environment; life-cycle analysis of waste management techniques to determine the most appropriate conversion approach; evaluation of the effectiveness of disposal technologies for marine litter; evaluation of biodegradable materials to reduce fishing ability of ALDFG such as pots, traps, and gillnets; evaluation of biodegradable plastic process outcomes and the relation to the creation of microplastics; evaluation of measures to reduce gear loss and increase retrieval; and studies on fishing gear modifications to reduce loss.[97]

The Honolulu Strategy does not provide for targets or deadlines. While it recognizes integrated solid waste management and extended producer responsibility it does not expand upon the specific application of these key principles for marine litter.[98]

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[97] Honolulu Strategy., p.12

[98] Ibid, p. 2

Table 3: International instruments, their application to marine plastic litter and options for strengthening

Instruments	Acronym	Designation	Binding /voluntary	Measures of implementation	Any annex related to plastics or fishing gear	Compliance mechanism	Gaps in addressing pollution of the marine environment related to plastic	Options for addressing marine plastic litter & microplastics
Pollution oriented instruments								
United Nations Convention on the Law of the Sea	UNCLOS	Protection of the marine environment from all sources of pollution	Legally binding global instrument	Varies – by reference to international rules and standards		Y	Does not expressly address marinemarine plastic litter and microplastics.	Strengthen the implementation of the relevant provisions of UNCLOS.
International Convention for the Prevention of Pollution from Ships	MARPOL	Address marine pollution from ships	Legally binding global instrument	All waste discharge prohibited except as listed.	Annex V - Prevention of pollution by garbage from ships (includes all plastics & fishing gear)	Y	Requirement to carry onboard a garbage management plan applies only to vessels 100 GT or more and ships certified to carry 15 persons or more / garbage record book required only for ships 400 GT and ships certified to carry 15 persons or more	Include vessels below 100 gross tonnage (most fishing vessels) that are not obligated to maintain garbage management plans and record books or retain receipts for port disposals.
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other	London Convention	Intentional dumping into the sea from ocean sources	Legally binding global instrument	Listing of prohibited pollutants and those requiring permits for	Annex of prohibited pollutants. Annex listing		Limited to intentional disposal of plastics at sea from ocean	Encourage ratification of the London Protocol as the preferred instrument (as agreed by the LC/LP Parties, the Convention

Matter (1972)				dumping activities	pollutants requiring dumping permit		sources	will not be amended)
Protocol for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (1996)	London Protocol	Intentional dumping into the sea from ocean sources	Legally binding global instrument	Dumping of all wastes not permitted except where prior assessment satisfies specific conditions	Annex of wastes permitted subject to conditions	Y	Limited to intentional disposal of plastics at sea from ocean sources	Improve levels of ratification. Address pathways identified by IMO of dredged material and sewage sludge.
The Convention on the Law of Non-Navigational Uses of International Wat ercourses	International Watercourses Convention	Conservation of shared watercourses, including surface and groundwater	Legally binding global instrument	Mutually agreeable measures and methods - joint water quality objectives		N	Does not expressly address marine plastic litter or microplastics	States must establish water quality standards, but no obligation to exchange such data unless requested. Establish duty to monitor and share results, including for macro- and microplastics.
Biodiversity-species oriented instruments								
Convention on Biological Diversity	CBD	Conservation of biological diversity	Legally binding global instrument	Voluntary guidelines		N	COP XIII/10 is not legally binding	Extend to include impacts on biodiversity from microplastics.
Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and	United Nations Fish Stocks Agreement	Straddling and highly migratory fish stocks	Legally binding global instrument	Conservation measures, ecosystem approach		Y	Limited to fishing gear. Application is limited to the conservation and management of straddling fish stocks and highly migratory fish stocks beyond areas under	Extend "catch by lost or abandoned gear" to include all impacts of ALDFG. Establish duty for all Regional Fisheries Bodies to enforce marking of fishing gear.

Management of Straddling Fish Stocks and Highly Migratory Fish Stocks							national jurisdiction except for those provisions mentioned in article 3.	
Convention on the Conservation of Migratory Species of Wild Animals	CMS	Conservation of migratory animals	Legally binding global instrument	Strategic Plan			Limited to two species	Extend guidelines for reduced risk to some species to all migratory species. Establish obligation for 'range states' to prevent harm from marine plastic litter and microplastics.
Chemicals and waste oriented instruments								
Stockholm Convention on Persistent Organic Pollutants	Stockholm Convention	Chemicals	Legally binding global instrument	Implementation plan	Annex A Annex B	Y (not in force)	Scope limited to certain chemicals used the production of certain plastics	Additional listings of chemical additives of concern used in plastics manufacturing.
Basel Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal	Basel Convention	Hazardous wastes and other wastes (plastics as other wastes)	Legally binding global instrument	Waste management measures		Y	Plastics not included as "hazardous waste." Efforts are underway to promote the environmentally sound management of plastic waste as a household waste, but these are guidelines only.	List plastics containing resins or additives of concern requiring appropriate disposal or recycling methods, e.g. those containing PCBs, decaBDE (both listed under the Stockholm Convention) and endocrine disruptors. Promote best management practices for the design, production and transport of plastics to reduce the generation

								of plastic waste.
Global Strategies and soft law instruments								
The 2030 Agenda for Sustainable Development	2030 Agenda	Broad scope, including pollution management	Non-binding				Non-binding	Application of a broader set of Sustainable Development Goals, not only SDG14.1.
FAO Code of Conduct for Responsible Fisheries	Code of Conduct	Fishing gear	Non-binding			N	Not binding	Encourage Regional Fisheries Bodies to establish standards for marking of fishing gear, not just national standards.
Global Programme of Action for the Protection of the Marine Environment from Land-based Activities	GPA	All land-based pollution	Non-binding intergovernmental mechanism			N	No specific targets to prevent, reduce or eliminate marine plastic litter or microplastics	Strengthen GPA to coordinate land- and sea-based activities, & engage industry to develop self-regulatory mechanisms.
SAICM adopted a Global Plan of Action	SAICM	All chemicals	Non-binding				Broad scope and does not expressly address marine plastic litter or microplastics	Broader application to additives used throughoutthroughout the lifecycle of plastics.
Honolulu Strategy: A Global Framework for Prevention and Management of Marine Debris	Honolulu Strategy	All land & ocean sources of marine debris	Strategy			N	Does not provide specific targets to prevent, reduce or eliminate marine plastic litter or microplastics	Revise to include targets and timelines.

2.6. Existing regional and sub-regional instruments and strategies

There are 18 Regional Seas within the UN Environment Regional Seas Programme, comprising of more than 143 countries. Only seven of these programmes are directly administered by UN Environment (See Table 4). The Programme was established in 1974 with the principle objective of addressing accelerating degradation of the marine and coastal environment.[99] In addition to differing administrative relationships with UN Environment the Regional Seas programmes also have different governance and institutional structures. Fourteen of the Regional Seas programmes have binding conventions whereas others only have adopted actions plans. Not all of the Regional Seas programmes have specific protocols regulating land-based sources of pollution or dumping.

Table 4: Listing of Regional Seas Programmes

UN Environment-administered Regional Seas Programmes:	Non-UN Environment administered Regional Seas Programmes established under the auspecies of UN Environment:	Non-UN Environment administered, independently established Regional Seas Programmes:
• Caspian Sea	• Black Sea Region	• Arctic Region
• East Asian Seas	• North-East Pacific Region	• Antarctic Region
• Eastern Africa Region	• Pacific Region	• Baltic Sea
• Mediterranean Region	• Red Sea and Gulf of Aden	• North-East Atlantic Region
• North-West Pacific Region	• ROPME Sea Area	
• Western Africa Region	• South Asian Seas	
• Wider Caribbean Region	• South-East Pacific Region	

2.6.1. Scope of application and obligations of land-based source instruments

The protocols of the different Regional Seas programmes that regulate land-based sources of pollution vary in their scope of application. The first generation of regional protocols for land-based sources of pollution mostly had a narrow scope of application and was referred to as "shoreline" protocols that did not cover inland activities within the drainage area that discharges into the sea. They also referred only to sources of pollution and not activities.[100] These protocols adopted a more restricted approach to listing those substances that were to be prohibited or regulated through permits (black/grey listing). This includes the 1992 Protocol on Protection of the Black Sea Marine Environment Against Pollution from Land Based Sources,[101] and the 1983 Protocol for the Protection of the South-East Pacific Against Pollution from Land-Based Sources.[102]

The second-generation protocols extend their scope to a broader inland and basin-wide approach. These include the Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities (revised);[103] the Protocol for the Protection of the Marine and Coastal

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[99] See UN Environment Regional Seas Programme, *Overview*, <http://www.unep.org/regionalseas/who-we-are/overview>, accessed 12 July 2017.

[100] Vinogradov, S., 'Marine Pollution via Transboundary Watercourses - An Interface of the Shoreline and River-Basin Regimes in the Wider Black Sea Region' (2007) 22 (2007) *International Journal of Marine and Coastal Law* 585-620.

[101] *Protocol on the Protection of the Black Sea Marine Environment against Pollution from Land-Based Sources*, opened for signature 21 April 1992, 32 ILM (1993) 1122 (entered into force 15 January 1994) ('*LBS Protocol for the Black Sea*') <http://www.blacksea-commission.org/_table-legal-docs.asp#odbsc>.

[102] *Protocol for the Protection of the South-East Pacific Against Pollution from Land-Based Sources*, opened for signature 22 July 1983, UNTS 73 (entered into force 23 September 1986) ('*LBS Protocol for the South-East Pacific*') <http://www.cpps-int.org/index.php/principal>.

[103] *Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities, as amended 7 March 1996*, opened for signature 7 March 1996, 1328

Environment of the Western Indian Ocean from Land-Based Sources and Activities;[104] Additional *Protocol* to the *Abidjan* Convention Concerning Cooperation in the Protection and Development of Marine and Coastal Environment from Land-based Sources and Activities in the Western, Central and Southern African Region,[105] the Protocol Concerning Pollution from Land-Based Sources and Activities for the Wider Caribbean Region,[106] the revised Protocol on the Protection of the Marine Environment of the Black Sea from Land-Based Sources and Activities,[107] the Protocol Concerning the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden[108]and the *Protocol* for the Protection of the Caspian Sea against *Pollution* from *Land-Based Sources* and Activities.[109] In addition, HELCOM Annex III (LBS) and Annex I of OSPAR provide for a broader geographic scope for land-based protocols than the shoreline scope by first generation LBS protocols.

UNTS 120 (entered into force 11 May 2008) ('*LBS/A Protocol for the Mediterranean*') <http://wedocs.unep.org/bitstream/handle/20.500.11822/7096/Consolidated_LBS96_ENG.pdf?sequence=5&isAllowed=y>.

[104] *Protocol for the Protection of the Marine and Coastal Environment of the Western Indian Ocean from Land-Based Sources and Activities*, opened for signature 31 March 2010, ('*LBS/A Protocol for the Western Indian Ocean*') <http://www.unep.org/nairobiconvention/protocol-protection-marine-and-coastal-environment-wio-land-based-sources-and-activities>.

[105] **_Additional Protocol to the Abidjan Convention Concerning Cooperation in the Protection and Development of Marine And Coastal Environment from Land-Based Sources and Activities in the Western, Central and Southern African Region (UNEP(DEPI)/WACAF/LBSA/MOP1/2)_, opened for signature 22 June 2012, ('_LBS/A Protocol of Western, Central and Southern African Region_') <http://abidjanconvention.org/media/documents/protocols/LBSA%20Protocol-Adopted.pdf>.**

[106] *Protocol Concerning Pollution from Land-Based Sources and Activities to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region*, opened for signature 6 October 1999, TRE-001331 (entered into force 13 August 2010) ('*LBS/A Protocol of the Wider Caribbean*') <http://cep.unep.org/repcar/lbs-protocol-en.pdf>.

[107] *Protocol on the Protection of the Marine Environment of the Black Sea From Land Based Sources and Activities*, opened for signature 07 April 2009, ('*LBS/A Protocol for the Black Sea*') <http://www.blacksea-commission.org/_convention-protocols.asp>.

[108] *Protocol concerning the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden*, opened for signature 26 September 2005, ('*LBA Protocol of the Red Sea and Gulf of Aden*') <http://www.persga.org/Documents/Doc_62_20090211124355.pdf>.

[109] *Protocol for the Protection of the Caspian Sea Against Pollution from Land-based Sources and Activities to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea*, opened for signature 12 December 2012, ('*LBS/A Protocol for the Caspian Sea*') <http://www.tehranconvention.org/IMG/pdf/Protocol_on_Pollution_from_Land_Based_Sources_and_Activities.pdf>.

Table 5: Summary of Regional Seas instruments relevant to marine plastic litter and microplastics
(Refer to Annex 8.1 for full titles)

Regional Seas Programme	Action Plans for Protection of the Marine Environment (voluntary)	Regional Convention (year entered into force)	LBS/A Protocol (year entered into force)	Action Plans/Strategies Specific to Marine Litter (voluntary, except Mediterranean Sea)
North-East Pacific	2002 Plan of Action for the Protection and Sustainable Development of the Marine and Coastal Areas of the North-East Pacific	2002 Antigua Convention (not in force)		Under develoment
ROPME Sea	1978 Action Plan for the Protection of the Marine Environment and the Coastal Areas of Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates	1978 Kuwait Agreement (1979)	1990 LBA Protocol (1993)	Under development
South-East Pacific	Plan de Acción para la Protección del Medio Marino y Áreas costeras del Pacifico Sudeste	1981 Lima Convention (1986)	1983 LBA Protocol (1986)	2007 Regional Programme on Marine Litter in the South-East Pacific (CPPS) Region
North-East Atlantic	2002 Regional Plan of Action 2010-2020 Strategy of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic	1992 OSPAR Convention (1998)	1992 OSPAR - Annex I (1998)	2014 North East Atlantic Marine Litter Regional Action Plan
Mediterranean	1995 Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean	1976 Barcelona Convention (1978) – amended 1995 (2004)	1996 Amended LBA Protocol	2013 Regional Plan on Marine Litter Management in the Mediterranean **(binding)**

Black Sea	2009 Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea	1992 Bucharest Convention (1994)	1992 LBA Protocol (1994) 2009 LBA Protocol (not in force)	**Report:** 2007 Marine Litter in the Black Sea Region (Ch 7: Proposals for Changes)* Marine Litter Action Plan – under development
Wider Caribbean	1983 Action Plan for the Caribbean Environment Programme	1983 Cartagena Convention (1986)	1999 LBS Protocol (2010)	2008 Wider Caribbean Regional Action Plan on Marine Litter 2014 – Revised Action plan
Red Sea & Gulf of Aden	1976 Action Plan for the Conservation of the Marine Environment and Coastal Areas of the Red Sea and the Gulf of Aden (revised 1995)	1982 Jeddah Convention (1985)	**2005 LBA Protocol (not in force)**	**Report: 2008 Red Sea & Gulf of Aden – Marine Litter in the PERSGA Region (Ch3: Strategies and Actions)***
Eastern Africa	1985 East African Action Plan	1985 Nairobi Convention (1996) – amended 2010 (not in force)	**2010 LBA Protocol (not in force)**	**Report: 2008 A Regional Overview & Assessment of Marine Litter Related Activities in the West Indian Ocean Region (Ch 3-4: Priorities and Recommendations for Action in Marine Litter Management)*** **Action plan under development**
Western Africa	1981 Action Plan for the Protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region	1981 Abidjan Convention (1984)	**2012 LBA Protocol (not in force)**	**Potential assessment**
Caspian Sea	2003 Caspian Strategic Action Programme	2003 Tehran Convention (2006)	**2012 LBA Protocol (not in force)**	**Report: 2009 Marine litter in the Caspian Region: Review and Framework Strategy (Ch 6: Recommended measures for marine litter mitigation in the Caspian)***
Antarctic		1959 Antarctic Treaty (1961) 1980 Protection of Marine Living Resources (1982)	1991 Protocol on Environmental Protection to the Antarctic Treaty - Annex	

			III Waste Disposal And Waste Management (1998)	
Pacific	SPREP Strategic Plan 2017-2026	1986 Noumea Convention (1990)		Marine Litter Action Plan – under development
Baltic	2007 Baltic Sea Action Plan	1992 Helsinki Convention (2000)	Annex III	2015 HELCOM Regional Action Plan for Marine Litter in the Baltic Sea
North-West Pacific	1994 Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region			2008 NOWPAP Regional Action Plan on Marine Litter
South Asian Seas	1995 South Asian Seas Action Plan. ANNEX IV of the Action Plan - Protection of the Marine Environment from Land-based Activities			**Report:** 2007 Framework for Marine Litter Management in the South Asian Seas Region (Part 2 of Review Of Marine Litter in the SAS Region)* Marine Litter Action Plan – under development
East Asian Seas	2000 East Asian Seas LBA Action Plan			2008 COBSEA Regional Action Plan on Marine Litter - revision in progress
Arctic	2009 Regional Programme of Action for the Protection of the Arctic Marine Environment from Land-based Activities			Assessment being undertaken which may inform future development of an action plan.

* Recommendations only, no action plan on marine litter

The broader scope of application of these second-generation protocols that reach inland and include sources and activities provides scope for measures to be adopted that could allow for a broad and comprehensive approach to addressing marine plastics and litter and microplastics originating from land-based sources. All second-generation instruments include point sources of pollution and activities that would extend to industry and manufacturers.

The obligations contained in these instruments are important in providing the scope of the object of the regulatory actions that need to be adopted as well as for determining compliance. The LBS/A protocols adopted under the Regional Seas Programme provide different levels of obligations.

The older instruments provide for a more limited scope of obligation that requires Parties to prevent, reduce and control pollution (1986 Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (Noumea); 1991 LBS Protocol for the Wider Caribbean and the 1992 Black Sea LBS Protocol, 1983 LBS Protocol for the East Pacific). However, most of the updated protocols go further and include obligations to eliminate. These include the revised LBS/A Protocol for the Mediterranean that imposes an obligation on the Parties to "take all appropriate measures to prevent, abate, combat and eliminate to the fullest possible extent pollution of the Mediterranean Sea Area". It also includes a general obligation to eliminate pollution from land-based sources and activities that includes an emphasis on phase-out of inputs of substances that are toxic, persistent and liable to bioaccumulate as listed in Annex I (article 5.1). Likewise, the revised LBS/A Protocol on the Protection of the Marine Environment of the Black Sea (2009) [entry into force pending] requires that the Contracting Parties shall individually or jointly take all appropriate measures to prevent, control and to the maximum extent possible eliminate pollution of and other adverse effects on the marine environment or coastal areas of the Black Sea from land-based sources and activities.

The 2005 LBA Protocol of the Red Sea and Gulf of Aden requires that the Contracting Parties "take all appropriate measures to protect the environment of the Red Sea and Gulf of Aden against pollution resulting from any land-based sources or activities and to reduce and/or eliminate such pollution to the maximum extent possible with priority given to the gradual elimination of toxic, persistent, and biologically accumulating inputs" (article 1). Additionally, the Contracting Parties are required to prevent pollution from land-based sources, with particular emphasis on the gradual elimination of inputs of toxic, persistent and biologically accumulating substances by implementation of work plans based on source control as specified in Annex II (article 5).

The 1992 Helsinki Convention requires the prevention and elimination of pollution in order to promote the ecological restoration of the Baltic Sea Area and the preservation of its ecological balance (article 3). Specifically, under article 6 of the Helsinki Convention, the Contracting Parties undertake to prevent and eliminate pollution of the Baltic Sea Area from land-based sources. Moreover, Annex III is dedicated to specific requirements of "Prevention of pollution from land-based sources." The OSPAR Convention provides a short but broad obligation to prevent and eliminate pollution from land-based sources (article 3). Parties to the LBS/A Protocol for the Caspian Sea must prevent, control, reduce and to the maximum extent possible eliminate pollution and other adverse effects (article 4). However, the more recent LBS/A Protocol of Western, Central and Southern African Region does require elimination of land-based sources of pollution but to prevent, reduce, mitigate and control pollution from land based sources and activities (article 5).

Table 5 demonstrates that some of the Regional Seas programmes have not developed an instrument, such as a protocol or annex, specifically to addresses land-based sources of pollution. This is a notable gap as protocols serve as implementing instruments that provide more detailed measures and obligations. In those regional seas programmes that have developed land-based protocols, while there are some differences in the scope of obligations, in particular whether elimination of pollution is included, in all cases the scope is broad enough to include marine plastic litter and microplastics. However, one challenge is that many of the protocols have not yet entered into force. This is one of the problems with legally binding instruments that require additional domestic actions by States before the instrument enters into effect.

2.6.2. Applicable principles

The Regional Seas conventions and protocols vary to some extent on their inclusion of principles applicable to the management of marine plastic litter and microplastics. These include:

- The *precautionary principle/approach*, which provides the basis for taking measures absent of scientific certainty of harm (LBS/A Protocol for the Mediterranean; revised LBS Protocol for the Black Sea; LBS/A Protocol for the Western Indian Ocean; LBS/A Protocol for the Caspian Sea; OSPAR Convention Annex I; Helsinki Convention Annex III) and
- The *polluter pays principle* (LBS/A Protocol for the Mediterranean; revised LBS Protocol for the Black Sea; LBS/A Protocol for the Western Indian Ocean; LBS/A Protocol for the Caspian Sea; Helsinki Convention Annex III).

There are also principles that set technical and science-based standards such as:

- *Best available techniques* (LBS/A Protocol for the Mediterranean; revised LBS Protocol for the Black Sea; LBS/A Protocol for the Western Indian Ocean; LBS/A Protocol for the Caspian Sea; OSPAR Convention Annex I);
- *Best available technology* (revised LBS Protocol for the Black Sea; LBA Protocol of the Red Sea and Gulf of Aden; Helsinki Convention Annex II);
- *Most appropriate technology* (LBS/A Protocol of the Wider Caribbean);
- *Clean production technologies* (LBS/A Protocol for the Mediterranean; OSPAR Convention, Annex I; LBA Protocol of the Red Sea and Gulf of Aden; LBS/A Protocol for the Caspian Sea; LBS/A Protocol of Western, Central and Southern African Region); and
- *Best environmental practice* (LBS/A Protocol for the Mediterranean; LBS/A Protocol of the Wider Caribbean; revised LBS Protocol for the Black Sea; LBS/A Protocol for the Western Indian Ocean; LBS/A Protocol for the Caspian Sea; OSPAR Convention Annex I; LBA Protocol of the Red Sea and Gulf of Aden; LBS/A Protocol of Western, Central and Southern African Region; and Helsinki Convention Annex III).

Integrated coastal management is another important principle for management of coastal marine litter (LBS/A Protocol of the Wider Caribbean; and revised LBS Protocol for the Black Sea). The Mediterranean Sea regional programme is the first to have adopted a separate protocol on Integrated Coastal Zone Management in the Mediterranean.[110]

Environmental impact assessments provide a key tool for managing detrimental effects to the marine environment. Those binding instruments that require Parties to conduct environmental impact assessments are: (1) LBS/A Protocol for the Mediterranean; (2) 1992 LBS Protocol for the Black Sea and the revised LBS Protocol for the Black Sea; (3) Cartagena Convention and LBS/A Protocol of the Wider Caribbean; (4) Jeddah Convention and LBA Protocol of the Red Sea and Gulf of Aden; (5) Amended Nairobi Convention and LBS/A Protocol for the Western Indian Ocean; (6) LBS/A Protocol for the Caspian Sea; (7) Helsinki Convention; (8) OSPAR Convention; (9) LBS/A Protocol of Western, Central and Southern African Region; and (10) Noumea Convention.

In addition, there are a number of principles provided in regional actions plans, some specific to marine debris/litter. These are:

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[110] Protocol on Integrated Coastal Zone Management in the Mediterranean, adopted in 21/01/2008, entered into force 24/03/2011.

- Sustainable consumption and production (Mediterranean,[111] Baltic,[112] North East Atlantic[113]);
- Best available knowledge and socio-economic effectiveness (Baltic, North East Atlantic);
- Integration (Mediterranean, Wider Caribbean Region,[114] East Asian Region,[115] East African,[116] Northwest Pacific;[117] Red Sea and Gulf of Aden;[118] Baltic, North East Atlantic);
- Reduce, Reuse, Recycle, Return (Northwest Pacific);
- 3R + Return (Pacific[119]);
- Product stewardship (Wider Caribbean; Pacific)
- Proximity principle (Pacific);
- Transparency (Northwest Pacific, Black Sea; Red Sea and Gulf of Aden; South Asian Seas; SPREP);
- Clean technology (Black Sea);
- Public-private partnership (SPREP).

There is considerable difference in the principles included in the various binding and non-binding instruments. Notably missing from the binding regional instruments (except for the Mediterranean) are marine litter specific principles.

Table 6: Summary of principles in regional LBS/A Protocols and Annexes

Regional Sea	**Name of LBS/A Protocol / Annex***	**Precaution**	**Polluter Pays**	**Best Available Technique**	**Best Available Technology**	**Most Appropriate Technology**	**Clean Production Technologies**	**Best Environmental Practice**	**Environmental Impact Assessment**	**Integrated Coastal Management**

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[111] *Regional Plan on Marine Litter Management in the Mediterranean in the Framework of Article 15 of the Land Based Sources Protocol (Decision IG.21/7)*, opened for signature 6 December 2013, (entered into force 8 July 2014) (*'Action Plan for Marine Litter in the Mediterranean'*) <http://www.unepmap.org/index.php?module=content2&catid=001011006>.

[112] HELCOM, *Regional Action Plan for Marine Litter in the Baltic Sea* (2015).

[113] OSPAR Commission, *Regional Action Plan for Prevention and Management of Marine Litter in the North-East Atlantic (2014-2021)* (2014).

[114] UNEP-CAR/RCU, *Regional Action Plan on Marine Litter Management (RAPMaLI) for the Wider Caribbean Region 2014 (CEP Technical Report: 72)* (United Nations Environment Programme Caribbean/ Regional

Coordinating Unit (UNEP-CAR/RCU), 2014).

[115] COBSEA, *Regional Action Plan on Marine Litter (RAP-MALI)* (2008).

[116] Lane, S. et al, *Regional Overview and Assessment of Marine Litter Related Activities in the West Indian Ocean Region.*, Report to the United Nations Environment Programme (2007).

[117] NOWPAP, *Regional Action Plan on Marine Litter (RAP MALI)* (2008).

[118] UNEP, *Marine Litter in the PERSGA Region* (2008).

[119] SPREP, *Cleaner Pacific 2025: Pacific Regional Waste and Pollution Management Strategy 2016–2025: Implementation Plan* (SPREP, 2016).

Mediterranean	LBS/A Protocol for the Mediterranean	x	x	x			x	x	x	X (ICZM Protocol)
Black Sea	1992 LBS Protocol for the Black Sea and the revised LBS Protocol for the Black Sea **(Rev)**	x	x	x	x			x	x	x
Eastern African	2010 LBS/A Protocol	x	x	x				x	x	
Caspian	2012 LBS/A Protocol	x	x	x			x		x	
North East Atlantic	1992 OSPAR Convention - Annex I	x	x	x			x	x	x	
Baltic Sea	1992 Helsinki Convention - Annex III	x			x			x	x	
Red Sea and the Gulf of Aden	2005 LBA Protocol				x		x	x	x	
Western, Central and Southern Africa	2012 LBS/A Protocol			x			x	x	x	
Wider Caribbean Region	1999 LBS/A Protocol					x		x	x	x
ROPME Sea Area	1990 LBA Protocol									
South East Pacific	1983 LBA Protocol									

* The 1991 Protocol on Environmental Protection to the Antarctic Treaty - Annex III Waste Disposal And Waste Management (1998) is not included in this table as it is not specific to LBS/A.

2.6.3. Measures of implementation

The following provides an overview of the different measures of implementation that have relevance to marine plastic litter and microplastics in general. Most of the LBS/A protocols of the Regional Sea Programme require Parties to adopt action plans, programmes and measures (Mediterranean, Wider Caribbean Region, Black sea (revised), Eastern African Region, Caspian, and Western, Central and Southern Africa). However, in addition, for example, the LBS/A Protocol for the Mediterranean, revised LBS Protocol for the Black Sea, LBS/A Protocol for the Caspian Sea and the LBS/A Protocol for the Western Indian Ocean require Parties to adopt timetables for implementing action plans, programmes and measures. And specifically, the LBS/A Protocol for the Mediterranean provides for the adoption of legally binding measures and timetables (article 15), (Annex 8.2 outlines targets).

The LBS/A Protocol for the Caspian Sea requires national action plans with timetables for achieving substantial reductions of inputs of pollutants from point sources on the basis of the list of hotspots. Furthermore, the LBS/A Protocol for the Mediterranean requires strict authorization system for point sources of discharge (article 6). Annex I of the OSPAR Convention on LBS requires that the Commission draw up plans for the reduction and phasing out of substances originating from land-based sources that are toxic, persistent and liable to bioaccumulate and when appropriate, programmes and measures for the reduction of inputs of nutrients from urban, municipal, industrial, agricultural and other sources.

The Helsinki Convention Annex III on LBS lists different specific measures to be taken for industrial and municipal sources of land-based pollution that includes, inter alia, treatment of municipal sewage; closed water systems for industrial plants or a high rate of circulation in order to avoid wastewater wherever possible; separate treatment for industrial wastewaters and wastewaters containing hazardous substances.

There is a wide range of different measures of implementation applied by the regional instruments. However, this assessment is limited to mapping implementing measures at a general level without delving into details of national implementation. As outlined above, some instruments have targets or timetables, others have strict permit systems and some address waste treatment measures in greater detail than others. Whether this translates into differences in actual results would require an additional study at the national level.

2.6.4. Compliance

All of the Regional Seas protocols on land-based sources of pollution include provisions for monitoring and reporting, although reporting requirements differ as to timing, content and procedure. Information provided in national reporting provides key information concerning the level of implementation and compliance with the obligations under a binding instrument. The best way to assess cumulative compliance is through a cooperative or regional compliance mechanism where national actions can be assessed. However, most of the protocols on land-based sources of pollution lack formal regional compliance mechanisms. The OSPAR Convention includes a provision on "compliance" which requires the OSPAR Commission to assess compliance of the individual Parties to the Convention, adopt decisions and recommendations based on periodical reports, and to take the necessary steps to bring about full compliance. Based on the reports submitted the Commission is able to make assessments on the level of compliance by the Parties and is also empowered under article 23 of the Convention to take the necessary steps to bring about full compliance. The OSPAR Commission can also adopt binding decisions (article 13 of Convention).

Many of the instruments require that Parties ensure compliance at the national level. For example, the OSPAR Convention Annex I on land-based sources of pollution specifically requires that the Contracting Parties provide for a system of regular monitoring and inspection by their competent authorities to assess compliance with authorizations and regulations of releases into water or air. This requirement is also seen in the LBS/A Protocol of Western, Central and Southern African Region and the LBS/A Protocol for the Caspian Sea. The LBS/A Protocol for the Mediterranean expressly requires system of inspection at the national level to assess compliance with authorization and regulations (article 6).

At the regional level the Mediterranean is the only Regional Seas Programme to date to establish a compliance mechanism, which was established in 2008.[120] OSPAR also provides for a compliance review process, which includes binding decisions by the Commission. Although, the revised LBS Protocol for the Black Sea requires the Parties to develop non-confrontational and non-judicial procedures of a consultative nature to ensure compliance with the provisions of the Protocol (article 17), the Protocol has not entered into force yet. In addition, the LBS/A Protocol for the Western Indian Ocean (article 10) and the LBS/A Protocol for the Caspian Sea (article18) requires that the Parties develop and adopt compliance and enforcement mechanisms but this has not yet happened.

The measures for achieving compliance vary among the different instruments, and in particular with regards the use of compliance and enforcement mechanisms.

2.6.5. Cooperation, capacity building and technical support, education and awareness and research and development

The provision of cooperation, capacity building and technical support to developing countries is essential in addressing marine plastic pollution globally. Sound waste management entails high costs that many developing countries are unable to undertake. For this reason, the assistance of high-income countries (financial and other) through cooperative arrangements is of high importance. Cooperation in scientific research and development such as sharing knowledge and costs will also further contribute to developing capacity to address the problem of pollution from marine plastic litter and

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[120] Contracting Parties to the Barcelona Convention, *Decision IG 17/2: Procedures and mechanisms on compliance under the Barcelona Convention and its Protocols*, UNEP(DEPI)/MED IG.17/10 Annex V, (Basel Convention Compliance Mechanism) https://wedocs.unep.org/bitstream/handle/20.500.11822/7282/08IG17_10_Ann5_17_02_Eng.pdf?sequence=9&isAllowed=y>.

microplastics. Education and awareness-raising of the public and industry are important for all countries to address the source of marine plastic pollution.

Those Regional Seas programmes that have binding conventions and protocols include provisions for cooperation in scientific and technical cooperation. However, not all provide for education and awareness. Those that expressly provide for education and awareness are the LBS/A Protocol of the Wider Caribbean (article XI), LBS/A Protocol of Western, Central and Southern African Region (article 6) and the LBS/A Protocol for the Western Indian Ocean (article 15).

2.6.6. Regional Seas action plans for marine litter

A number of the Regional Seas programmes have adopted actions plans specifically addressing marine litter/plastics debris and microplastics. However, only the action plan adopted by the Mediterranean Sea RSP is legally binding. Nevertheless, while most of the action plans are not legally binding, they do create a basis for action by States to address marine plastic litter and microplastics that is not expressly provided under the different legally binding instruments. These actions include engagement with industry, recycling, or the use of economic incentives for reduction of the use of plastics. For example, the action plan for OSPAR encourages engagement with industry to develop best environmental practices, and also encourages recycling of plastics. In addition, OSPAR encourages states to adopt incentives to reduce single use plastics bags and also to develop environmental certification schemes. The Helsinki Convention encourages engagement with business to develop solutions for reducing the entry of plastics into the marine environment. The Helsinki Convention also makes explicit reference to microparticles. These action plans establish a shared commitment and common regional actions for addressing various sources of marine litter in the respective regional sea.

The Regional Plan on Marine Litter Management in the Mediterranean, adopted by the Contracting Parties to the Barcelona Convention in 2013, provides a potential model for best practice. The Regional Plan builds upon key principles that guide the Contacting Parties in implementing it. These principles include the integration principle by virtue of which marine litter management shall be an integral part of solid waste management and other relevant strategies, the prevention principle, the precautionary principle, the polluter-pays principle, as well as the ecosystem-based approach, the public participation and stakeholder involvement and the sustainable consumption and production. The Regional Plan measures impose clear obligations regarding the waste management hierarchy, closure of illegal dumping/dumpsites, shift to sustainable consumption and production patterns, removal of existing marine litter using environmentally sound practices such as fishing for litter, clean up campaigns, port reception facilities at possibly no special fees, and monitoring, assessment and reporting on implementation of measures as well as enforcement of national legislation. The 2013 Regional Plan specifically promotes cooperation with businesses such as developing voluntary agreements with retailers and supermarkets to set an objective of reduction in plastic bag consumption and/or establishment of plastic bag taxes. With regards to the provisions of the Regional Plan on Marine Litter for monitoring and assessment (article 11 & 12), an Integrated Monitoring and Assessment Programme (IMAP) covering marine litter has been established in the Mediterranean, on the basis of regionally agreed common indicators, in line with adopted Ecological Objectives, Good Environmental Status definitions and related targets.

The Regional Action Plan on Marine Litter Management for the Wider Caribbean Region, for example, provides that the Parties conduct assessments of existing legislation, regulations and enforcement practices that deal with marine litter and strengthen or enact new legislation/regulations as appropriate. The Action Plan places noticeable emphasis on strengthening domestic compliance with laws and regulation through measures such as the mobilization of resources for improving capacity for enforcement of appropriate integrated waste management practices; establishing the infrastructure for compliance with existing marine litter management legislation at the national and community levels; training for judiciary/magistrates/enforcement officers and sensitization of politicians on marine litter issues. It also includes engagement of the business community.

The 1985 Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African region focuses on strengthening the legal framework for addressing pollution in general. The Action Plan calls for the review of national legislation and regulations pertaining to the protection and development of the marine and coastal environment, which should be necessary expanded, updated or strengthened where needed. Furthermore, enforcement is underlined calling for improvement of the enforcement of national regulations related to marine and coastal resources. The region has not developed an action plan specific to marine litter that would better address marine plastic litter and microplastics.

Some of the Regional Seas programmes that lack binding instruments specifically addressing land-based sources of pollution have nonetheless adopted actions plans to address marine litter and plastics. These include the East Asia Seas (COBSEA), the Northwest Pacific (NOWPAP) and the South Pacific (SPREP).[121]

SPREP, which does not have a protocol addressing land-based sources of pollution, adopted the Pacific Regional Solid Waste Management Strategy 2010–2015 and more recently a comprehensive and long-term strategy called the South Pacific: CLEANER PACIFIC 2025: Pacific Regional Waste and Pollution Management Strategy 2016-2025.[122] Marine litter has been identified as a priority area in this strategy. The guiding principles adopted include inter alia Reduce, Reuse, Recycle and Return (3Rs + Return), product stewardship, polluter pays, proximity, transparency, precaution, and the selection of appropriate and affordable technology. Strategic goals include the prevention or minimization of waste production and their associated impacts, recovery of wastes and pollution, improvement of the life-cycle management of residuals and improved monitoring of the receiving environment. Notably, the plan has provided for performance indicators, baseline information, and targets for 2020 and 2025. In addition, it provides for strategic actions such as strengthening institutional capacity, promoting public-private partnerships, implementing sustainable best practices for waste, chemicals and pollutants, developing human capacity and promoting cooperation at the national and regional levels.

NOWPAP, which has no binding instruments for the protection of the marine environment, adopted the NOWPAP Regional Action Plan on Marine Litter (RAP-MALI). This has been implemented since 2008. The Action Plan aims to encourage national and regional actions to prevent marine litter input to the marine and coastal environment; monitor marine litter quantities and distribution; removal of existing marine litter and the disposal thereof. NOWPAP recently prepared a report on Best Practices in dealing with Marine Litter in Fisheries, Aquaculture and Shipping Sectors in the NOWPAP region. Importantly, NOWPAP has also established a marine litter database and has been monitoring activities related to marine litter. However, it should be noted that, as the sole instrument in the region for the prevention of marine plastic litter and microplastics, the Action Plan is not binding.

COBSEA is another of the RSP that lacks binding instruments for the protection of the marine environment. In 2008 the 19th Intergovernmental Meeting adopted the COBSEA Regional Action Plan on Marine Litter through its resolution.[123] This action plan is currently under revision.

The marine litter action plans under development or revision include:

1. The North-East Pacific;
2. The Black Sea;
3. The Regional Organisation for Protection of the Marine Enviroment (ROPME);[124]
4. The Pacific;
5. The South Asian Seas;
6. The East Asian Seas.

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[121] SPREP also serves as the Secretariat for the Convention to Ban the importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement of Hazardous wastes within the South Pacific Region (Waigaini Convention).

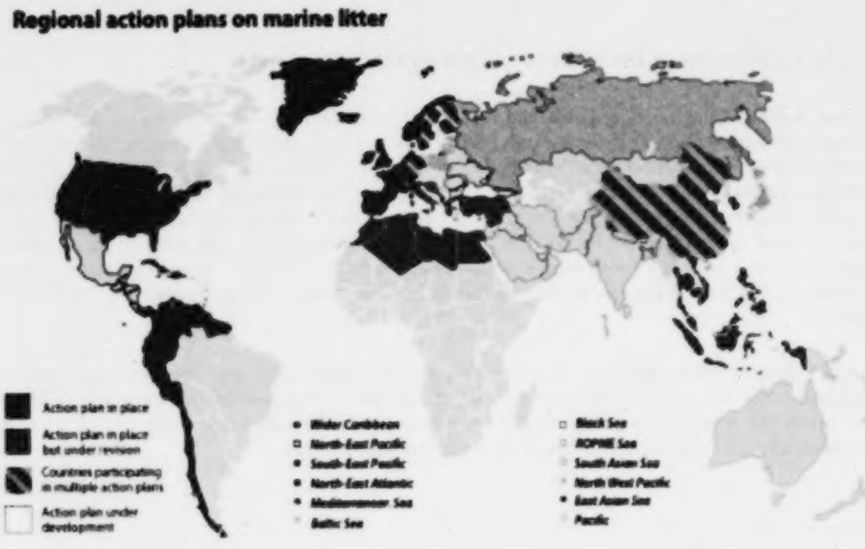
[122] SPREP, above n 119.

[123] COBSEA, above n 115.

[124] According to Article II of the Kuwait Regional Convention, the ROPME Sea Area (RSA) is defined as extending between the following geographic latitudes and longitudes, respectively: 16°39'N, 53°3'30"E; 16°00'N, 53°25'E; 17°00'N,56°30'E; 20°30'N, 60°00'E; 25°04'N, 61°25'E.

See Table 5 for a complete list of binding and voluntary regional instruments relevant to marine plastic litter and microplastics and Figure 3 below.

Figure 3: Regional action plans on marine litter


Regional action plans on marine litter
Action plan in place
Action plan in place but under revision
Countries participating in multiple action plans
Action plan under development
Wider Caribbean
North-East Pacific
South-East Pacific
North-East Atlantic
Mediterranean Sea
Baltic Sea
Black Sea
ROPME Sea
South Asian Sea
North West Pacific
East Asian Sea
Pacific

2.6.7. European Union Marine Strategy Framework Directive

While not a Regional Sea Programme, the Marine Strategy Framework Directive (MSFD) [125] provides an example of a European Union framework for addressing marine litter. The MSFD is a legally binding instrument that was adopted in 2008. The Directive aims to achieve or maintain good environmental status (GES) in the marine environment by 2020 (article 1). Each Member State was required to develop a strategy for its marine waters by 2013 (Marine Strategy) based on action plans set out in article 5 of the MSFD to attain GES by 2020. These are to be reviewed and renewed every six years. The MSFD applies to EU marine waters within four marine regions: the Baltic Sea, North-East Atlantic Oceans, Mediterranean Sea, and Black Sea. The member States of the EU are required, where practical and appropriate, to cooperate through existing regional institutional cooperation structures, including the Regional Sea Conventions. The implementation of the MSFD is based on eleven qualitative descriptors for determining good environmental status listed in Annex I of the Directive, which includes Descriptor 10 that requires properties and quantities of marine litter do not cause harm to the coastal and marine environment. While marine plastic litter and microplastics has not been specifically identified in Descriptor 10, a guidance document on marine litter was developed by the MSFD Subgroup that does address marine plastics and microplastics.[126] Under Descriptor 10, it is understood that marine litter refers principally to plastics.

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[125] *Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)*, OJ L 164, 25.6.2008, p. 19–40 (entered into force 17 June 2008) ('*MSFD, Directive 2008/56/EC*') <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32008L0056>.

[126] European Commission, *Guidance on Monitoring of Marine Litter in European Seas: A guidance document within the Common Implementation Strategy for the Marine Strategy Framework Directive* (Joint Research Centre, Institute for Environment and Sustainability, 2013).

In 2016 the EU Commission issued a Communication on Ocean Governance aiming at more sustainably managed oceans in Europe and around the world, including several actions on marine litter.[127] By the end of 2017 the EU Commission will adopt a Strategy for this issue (it is currently under a consultation process).

2.7. Assessment of the Current Legal Framework

This assessment of the existing global and regional legal instruments reveals a varied landscape of thematic instruments. UNCLOS is the only global binding instrument that addresses all sources of pollution relevant to marine plastic litter and microplastics. However, it is a framework instrument providing for broad obligations and principles leaving the details of implementation to States or through cooperative mechanisms at the regional or global levels such as the IMO or the UN Environment. Other global instruments examined are narrower in their approach, focusing either on specific activities such as dumping, transport of hazardous wastes, or addressing specific chemicals. In some instances, such as the Basel Convention, requirements on "minimization" of wastes and management of wastes are included.

The more fit-for-purpose approach to addressing marine plastic litter and microplastics, including engagement with industry, application of the extended producer responsibility principle, or the 3Rs+R are found in the non-binding global strategies. Similar to the binding instruments the non-binding instruments also display a varied approach to addressing marine plastics.

The Regional Seas programmes are very fragmented in their legal structure in general (see figure 4) and also specifically for addressing land-based sources of pollution. In some cases, there are no binding instruments at all, relying on non-binding instruments. Additionally, in those Regional Seas programmes that have developed binding instruments not all have developed protocols or other binding instruments specifically to address land-based sources of pollution. Among the instruments addressing land-based sources of pollution several are not yet in effect. As for those that are in effect, they too differ in respect to their scope of geographic and substantive application. While the Regional Seas programmes could potentially have a significant impact on addressing marine plastic litter, this would require expanding the existing number of Regional Seas programmes that have adopted binding instruments. To some degree some of the gaps have been addressed with action plans, but again these are varied in their approaches and methodologies.

Figure 4: Regional instruments for the protection of the marine environment

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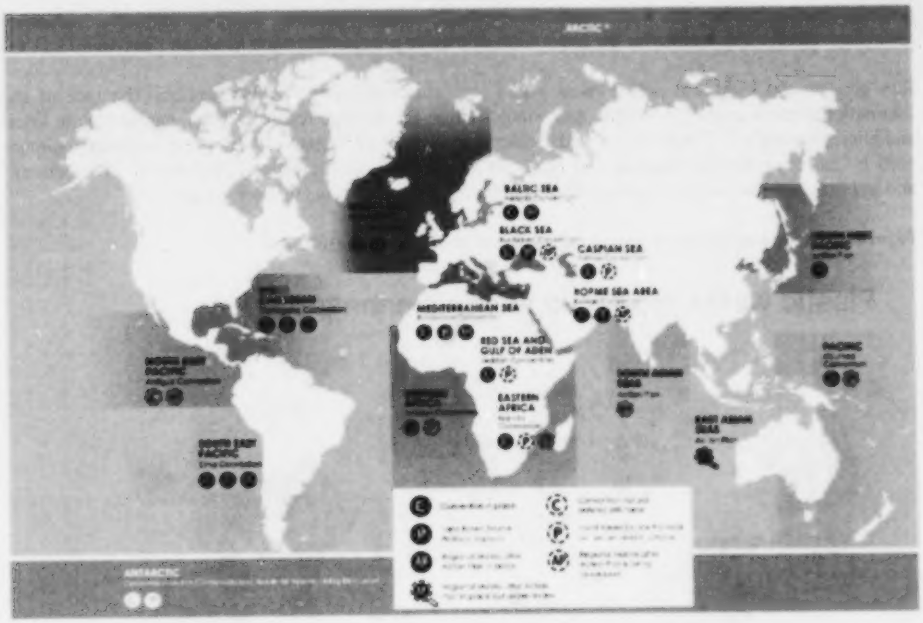
[127] European Commission Maritime Affairs, *International ocean governance: an agenda for the future of our oceans*, <https://ec.europa.eu/maritimeaffairs/policy/ocean-governance_en>, accessed 3 July 2017.



Note: The Baltic Sea region has adopted an Annex to the Helsinki Convention (not a Protocol) to manage land-based sources of marine pollution.

Overall, the existing global and regional legal landscape for addressing marine plastic litter and microplastics is fragmented and uneven. While, in total, these instruments could address both upstream and downstream aspects of marine plastic litter and microplastics this would require a high level of coordination and expansion of the scope of these different instruments, as well as the relevant secretariats, that may not be easily attained. Furthermore, the instruments have different levels of ratification, adding another level of complexity to efforts of coordination among them. However, as the inter-agency mechanism for coordination and cooperation on oceans and coastal issues, including marine litter, UN-Oceans seeks to enhance the coordination, coherence and effectiveness of competent organizations of the United Nations system and the International Seabed Authority,[128] in conformity with the United Nations Convention on the Law of the Sea, the respective competences of each of its participating organizations and the mandates and priorities approved by their respective governing bodies.

3. Gaps and Trends

Marine plastic litter and microplastics are a preventable problem. Much of the plastic waste that ends up in the oceans is as a result of mismanagement (see figure 5). Yet marine plastic litter and microplastics are not adequately addressed at the international level in both binding and voluntary instruments. Section 2 has shown that some of the Regional Seas conventions and their LBS/A protocols provide measures that can be applied to marine plastic litter and microplastics, such as improvements in waste management and regulation of various industry activities. These, however, require strengthening and broader implementation that is more specific to the issues presented by marine plastic litter and microplastics. Those Regional Seas areas that have not adopted binding instruments for land-based sources of marine pollution lack mandatory measures applicable to the lifecycle of plastics. This is particularly evident in those key regions responsible for the generation of marine plastic litter such as South East Asia.

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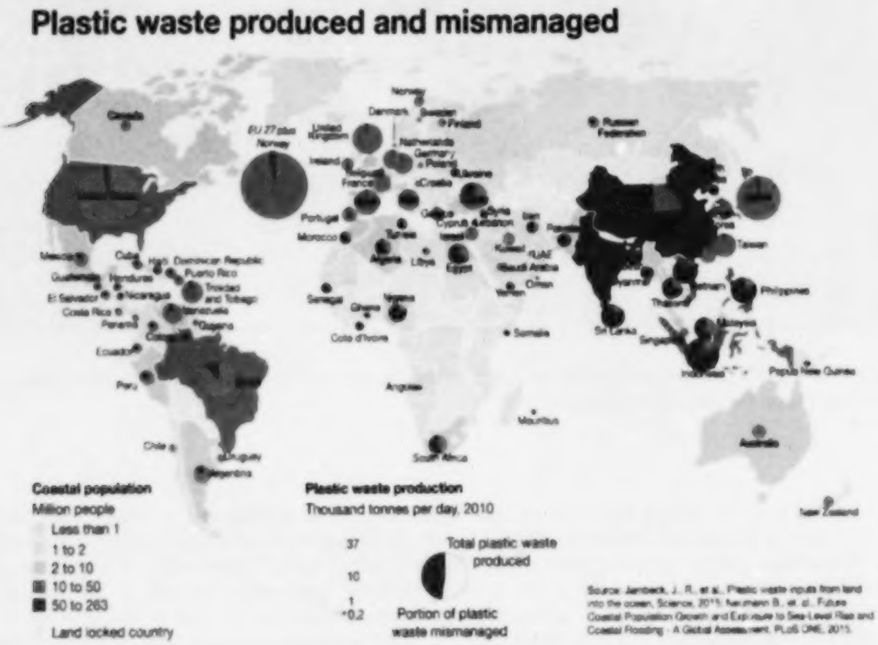
[128] Twenty-four entities with various expertise in different oceans and law of the sea matters are members of UN-Oceans. See www.unoceans.org

Key gaps in the legal and policy frameworks are further discussed in this section. The lack of an international mechanism for liability and compensation for damage resulting from marine plastic litter and microplastics is an identified gap and is discussed in option 3 of Section 5. Overall, there are regional gaps in data regarding the sources and extent of plastics and microplastics in the marine environment and in organisms, as well as the associated health and ecological risks this presents.[129]

Figure 5: Estimated plastic waste produced and mismanaged globally


Plastic waste produced and mismanaged
Canada
EU 27 plus Norway
Mexico
Cuba
Peru
Angola
Mauritius
South Africa
Somalia
Philippines
Taiwan
Sri Lanka
Papua New Guinea
Australia
New Zealand
Coastal population
Million people
Less than 1
1 to 2
2 to 10
10 to 50
50 to 263
Land locked country
Plastic waste production
Thousand tonnes per day, 2010
37
10
1
<0.2
Total plastic waste produced
Portion of plastic waste mismanaged
Source: Jambeck, J. R., et al., Plastic waste inputs from land into the ocean, Science, 2015; Neumann B., et al., Future Coastal Population Growth and Exposure to Sea-Level Rise and Coastal Flooding - A Global Assessment, PLoS ONE, 2015.

Source: GRID-Arendal and Maphoto/Riccardo Pravettoni (available at www.grida.no/resources/6931)

3.1. Gaps in mandate to manage upstream intervention

3.1.1. International

As a framework convention, the United Nations Convention on the Law of the Sea does not specifically address pollution of the marine environment by plastic waste. Measures of effectiveness are not provided for achieving the required protection and preservation of the oceans. This is instead delegated to "the competent international organization." For ocean sources, this is the IMO.[130] As per article 207(4), the UN Environment hosted GPA may be considered a "competent international organization" that can facilitate "diplomatic conference." Any efforts by the international community to manage upstream land-based activities would need to be compatible with the principle of State sovereignty.

Section 2 highlighted the measures in the Basel and Stockholm Conventions that can apply to the reduction of land-based sources of marine plastic litter and microplastics. As discussed, the application of the Stockholm Convention is narrow. As an example, the application of packaging makes up the major market sector for plastics.[131] Globally, 32% of packaging is estimated to escape collection systems,[132] potentially making its way into marine environments. Chemicals have been shown to migrate from packaging into food[133] but these chemicals may not be appropriate for regulation under the Stockholm Convention.[134] At a global level, the production, use and disposal of large volumes of chemicals used in plastics will therefore not be regulated under this Convention.

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[129] UNEP/MAP, *Marine Litter Assessment in the Mediterranean* (United Nations Environment Programme / Mediterranean Action Plan (UNEP/MAP), 2015).

[130] International Maritime Organization (IMO), above n 40, Section 2, Para. 2.1.3.

Much of the packaging category of wastes would be municipal wastes and classified as "other" wastes under the Basel Convention. They would therefore fall under the broad duty of this Convention for States to reduce the generation of such waste, regulate their transboundary movements and ensure environmentally sound management and disposal thereof. No indicators of success or timelines for the reduction in the generation of plastic wastes are provided by the Basel Convention or the non-binding technical guidelines. By reducing the generation of plastic waste, the Basel Convention would indirectly reduce the generation of microplastics resulting from the breakdown of macroplastics. It also gives Parties the mandate to ban the production and use of microbeads and implement regulations giving effect to Operation Clean Sweep to prevent pellet loss.

As noted in Section 2, the London Protocol regulates the act of dumping, not the source of waste streams that may under some circumstances be permitted for dumping. MARPOL Annex V provides for waste minimization but would not necessarily deal with all upstream activities.

3.1.2. **Regional**

The Regional Seas Programme is currently best placed to protect the oceans from land-based sources. The regional approach promoted in the UNCLOS is given effect through the adoption of conventions and LBS/A protocols within many, but not all, regions (see Table 4 for summary of Regional Seas instruments). Due to the fragmented legal framework at the regional level, a uniform mandate does not exist across all Regional Seas Conventions to regulate the "upstream" activities of the plastics industry. Some instruments require consideration of the lifecycle of products and the management of all activities taking place within the jurisdiction of member States. Other Regional Seas Conventions have not adopted measures to regulate industry on land beyond the requirement to regulate point-source emissions in order to meet water and air quality standards. Most have focused on improvement of solid waste management services and the integration of marine litter into those policies. Microfibres are a significant contributor to microplastics in the oceans.[135] A lifecycle assessment of synthetic textiles, for example, would need to consider if the wear-and-tear resulting from intended use meets air and water quality standards.

An example where such a mandate has been established is the LBS Protocol to the Barcelona Convention (article 4; Annex I, Part A Sectors of Activity; Annex I Part C Categories of Substances). The textile industry, aquaculture, the waste management industry and litter of specifically mentioned. The Regional Plan on Marine Litter Management for the Mediterranean provides for binding measures to regulate "discharges originating from land-based point and diffuse sources and activities within the territories of the Contracting Parties that may affect directly or indirectly the Mediterranean Sea Area." This may arguably provide States with the mandate to regulate the physical and chemical design of products.

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[131] PlasticsEurope, *Plastics – the Facts 2016. An analysis of European plastics production, demand and waste data* (2016).

[132] World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company, *The New Plastics Economy – Rethinking the future of plastics* (2016).

[133] Bhunia, K. et al. 'Migration of Chemical Compounds from Packaging Polymers during Microwave, Conventional Heat Treatment, and Storage' (2013) 12(5) *Comprehensive Reviews in Food Science and Food Safety* 523-545.

[134] For example, see *Commission Regulation (EU) No 10/2011 of 14 January 2011 on plastic materials and articles intended to come into contact with food Text with EEA relevance*, OJ L 12, 15.1.2011, p. 1–89 (*'Regulation on Food Contact Material'*) <http://eur-lex.europa.eu/eli/reg/2011/10/oj>.; *Commission Regulation (EC) No 282/2008 of 27 March 2008 on recycled plastic materials and articles intended to come into contact with foods and amending Regulation (EC) No 2023/2006 (Text with EEA relevance)*, OJ L 86, 28.3.2008, p. 9–18 <http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32008R0282>.

[135] Browne, M. A. et al, 'Spatial Patterns of Plastic Debris along Estuarine Shorelines' (2010) 44(9) (2010/05/01) *Environmental Science & Technology* 3404-3409.

3.2. Gaps in geographic scope

Coastal States are responsible for the greatest contribution to marine plastic litter and microplastics.[136] Waterways leading from land-locked States are also pathways for these contaminants to reach the oceans. The latter source could be regulated under the UN Watercourses Convention, but application of this Convention would be restricted to States that share a boundary watercourse.

3.2.1. International

The London Protocol extends the ban on dumping of plastics and incineration of all wastes as per the Protocol into the marine internal waters of a contracting Party (articles 5, 7). For coastal and flag States that are not Party to the London Protocol, it can be argued that an implied duty to comply with its measures is established through article 210 of the United Nations Convention on the Law of the Sea, which mandates that States adopt national laws to prevent pollution by dumping that are "no less effective … than global rules and standards."[137]

Disposal of garbage and fishing gear by vessels during normal operations is regulated under MARPOL Annex V. UNCLOS makes use of the term "may" in article 211(4), thereby leaving it to the discretion of coastal States, in the exercise of their sovereignty within their territorial sea, to adopt laws and regulations for the prevention, reduction and control of marine pollution from foreign vessels and, consequently, apply the measures of MARPOL Annex V to foreign vessels operating within their territorial seas. With 152 States having ratified Annex V, representing nearly 99% of the worlds shipping tonnage, this represents a small policy gap in the prevention of marine plastic litter and microplastics from this source. The duty to comply with Annex V is implied within UNCLOS for all flag States irrespective of the maritime zone vessels flying their flag are operating in,[138] but due to distance this may be difficult to enforce.

On the high seas, fishing vessels must conduct activities within the conditions set by the United Nations Convention on the Law of the Sea and other international law instruments to which their flag State is a party.[139] These instruments include the United Nations Fish Stocks Agreement (UNFSA), instruments adopted under the FAO, and measures adopted by Regional Fisheries Bodies. UNFSA applies only to vessels fishing for straddling fish stocks and highly migratory fish stocks.[140] The duty established by the UNFSA to minimize pollution and catch by ALDFG (implying a duty to prevent ALDFG) is limited in terms of geographic scope.[141] There are eighty-six parties to the Agreement.[142] China, the world's largest fishing nation, as well as Malaysia, Mexico, Myanmar, Peru and Vietnam are not parties to the Agreement despite being in the top 16 producers of marine capture fisheries.[143] Not all marine capture fisheries would target straddling or highly migratory fish stocks as per the UNFSA and, although the contribution of fisheries to the issue is acknowledged,[144] the scope of the agreement in preventing marine plastic litter and microplastics is limited.

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[136] Reisser, J. et al, 'Marine Plastic Pollution in Waters around Australia: Characteristics, Concentrations, and Pathways' (2013) 8(11) *PLoS One* e80466.; Jambeck, J. R. et al, above n 16.

[137] Birnie, P. et al, *Environmental Law and the Environment* (Oxford University Press, Third ed, 2009).; International Maritime Organization (IMO), *Implications of the United Nations Convention on the Law of the Sea for the International Maritime Organization (LEG/MISC/8 10-12)* (International Maritime Organisation, 2014).

[138] United Nations Division for Ocean Affairs and the Law of the Sea, *United Nations Convention on the Law of the Sea* (1982)., article 211(2)

[139] 1982 Law of the Sea Convention., article 87(1)

[140] Ibid, article 64

[141] For further discussion, see Tsamenyi, M. and Hanich, Q., 'Fisheries jurisdiction under the Law of the Sea Convention: rights and obligations in maritime zones under the sovereignty of Coastal States' (2012)

[142] DOALOS, *Chronological lists of ratifications of, accessions and successions to the Convention and the related Agreements*, Division for Ocean Affairs and the Law of the Sea, United Nations, <http://www.un.org/depts/los/reference_files/chronological_lists_of_ratifications.htm>, accessed 12 September 2017.

[143] FAO, *The State of World Fisheries and Aquaculture 2016. Contributing to food security and nutrition for all.* (2016).

3.2.2. **Regional**

As discussed in Section 2, Fourteen Regional Seas have adopted an overarching legally binding instrument (Conventions) for the preservation of their shared sea,[145] nine of which have adopted corresponding LBS/A Protocols.[146] However, four of these LBS/A protocols[147] and one convention are not yet in force. Also within these fourteen regions, the binding instruments of the Baltic and North-East Atlantic (OSPAR) have included Annexes to the Conventions that can be applied to the prevention of marine plastic litter and microplastics. The Antarctic includes an applicable Annex to the Protocol to the Antarctic Treaty that provides for Waste Disposal And Waste Management.

The mandates of most of the Regional Seas do not extend beyond the relevant geographical scope defined in a convention (convention area). Demarcation of the scope of application varies amongst the Regional Seas, with most conventions limiting the scope to areas within national jurisdiction. Gaps exist in the protection of the high seas, making the efforts of coastal States within territorial seas and EEZs[148] key in complying with the duty to prevent transboundary harm. Five Regional Seas do, however, extend the duty to prevent pollution of the marine environment beyond the established convention area.[149] The South Pacific contains high seas that are completely enclosed from all sides by the EEZs of participating States. These areas beyond national jurisdiction are included in the 1986 Convention of the South Pacific Region.[150] In some regions, the effort required is "best endeavors,"[151] "as far as possible"[152] or to "the extent possible."[153] Conventions may also limit the duty to only increases in existing levels of pollution.[154] Although the duty to prevent pollution of areas beyond national jurisdiction may be mandated, the prevention of harm may only apply to areas of other States that are party to the convention.[155] Others recognize the potential for measures taken in the region to ensure they do not lead to the transfer of pollution, directly or indirectly, to areas regulated under the Convention.[156]

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[144] FAO, *Microplastics in fisheries and aquaculture*. FAO Fisheries and Aquaculture Technical Paper 615 (Food and Agriculture Organization of the United Nations, 2017).

[145] These are the North-East Pacific, the ROPME Sea, the South-East Pacific, the North-East Atlantic, the Mediterranean Sea, the Black Sea, the Wider Caribbean, the Red Sea & Gulf of Aden, Eastern Africa, Western Africa, the Caspian Sea, the Antarctic, the Pacific and the Baltic.

[146] These are the ROPME Sea, the South-East Pacific, the Mediterranean Sea, the Black Sea (2009 revision not yet in force), the Wider Caribbean, the Red Sea & Gulf of Aden, Eastern Africa, Western Africa and the Caspian Sea.

[147] These are the Black Sea, the Red Sea and Gulf of Aden, Western Africa and the Caspian Sea.

[148] Warner, R. M., 'Conserving marine biodiversity in the global marine commons: co-evolution and interaction with the Law of the Sea' (2014) 1(6) *Frontiers in Marine Science* 1-23.

[149] These are the North-East Atlantic (OSPAR Convention), the Antarctic (CAMLR Convention), the Mediterranean (Barcelona Convention), the South Pacific Region (Noumea Convention) and the South-East Pacific (Lima Convention). See UN Environment, *Regional Seas programmes covering Areas Beyond National Jurisdictions*, Regional Seas Reports and Studies No.202 (2017).

[150] *Convention for the Protection of the Natural Resources and Environment of the South Pacific Region*, opened for signature 24 November 1986, (entered into force 22 August 1990) ('*Noumea Convention*') <https://www.sprep.org/legal/noumea-convention>., article 2(a.ii).

[151] *Convention on the Protection of the Marine Environment of the Baltic Sea Area*, opened for signature 9 April 1992, 1507 UNTS 167 (entered into force 17 January 2000) ('*Helsinki Convention*') <http://www.helcom.fi/Documents/About%20us/Convention%20and%20commitments/Helsinki%20Convention/1992_Convention_1108.pdf>., article 3(6); 1986 Noumea Convention., article 4(2).

[152] *Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific*, opened for signature 12 November 1981, 1648 UNTS 3 (entered into force 19 May 1986) ('*Lima Convention*') <http://www.cpps-int.org/index.php/principal>., article 2(5).

[153] 1983 LBS Protocol for the South-East Pacific., article XI.

[154] 1986 Noumea Convention., article 4(2); *Convention for the Protection of the Marine Environment of the North-East Atlantic*, opened for signature 22 September 1992, 2354 UNTS 67 (entered into force 25 March 1998) ('*OSPAR Convention*') <http://www.ospar.org/convention/text>., article 2(4).

Six Regional Seas programmes have adopted action plans specific to marine litter.[157] One of these, the East Asian Seas, is under revision and five new action plans are under development (*see* section 2.6.6). The Arctic is a region that has no binding or voluntary instrument specific to marine litter. It has one non-binding instrument that can be applied to the management of marine litter, namely the Regional Programme of Action for the Protection of the Arctic Marine Environment from Land-based Activities. A working group of the Arctic Council is undertaking a *Desktop Study on Marine Litter including Microplastics in the Arctic*, which may lead to the development an Arctic regional action plan on marine litter.[158] Refer to Table 4 for a summary of instruments of the Regional Seas Conventions.

3.3. Gaps in recognition of risks to human health

It has been noted that "[e]xamining the relationship between plastic additives and adverse human effects presents a number of challenges. In particular, the changing patterns of production and use of both plastics, and the additives they contain, as well as the confidential nature of industrial specifications makes exposure assessment particularly difficult."[159]

Human exposure to plastic additives occurs directly through contact or indirectly through contamination of food sources.[160] Research has increasingly shown the bioaccumulation of plastic additives in organisms. These additives include flame retardants, stabilisers, Bisphenol A (BPA) and Polybrominated diphenyl ethers (PBDE).[161] While the health implication of some is not yet fully understood for humans,[162] others are known to have adverse effects on humans, including cancer[163] and thyroid functioning.[164] In researching the effects bisphenol A (BPA) has on the endocrine system, the rapidly increasing rate of obesity was shown to track a parallel course with the consumption of plastic and other endocrine disrupting products.[165]

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[155] *Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific*, opened for signature 18 February 2002, ('*Antigua Convention*') <https://wedocs.unep.org/rest/bitstreams/46335/retrieve>., article 5(5).

[156] *Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region*, opened for signature 23 March 1981, 20 ILM (1981) 746 (entered into force 05 August 1984) ('*Abidjan Convention*') <http://abidjanconvention.org/index.php?option=com_content&view=article&id=100&Itemid=200&lang=en>. (Abidjan Convention), article 4(5); 2012 LBS/A Protocol of Western, Central and Southern African Region., article 5(5).

[157] These are the Mediterranean, the North East Atlantic (OSPAR), the North-West Pacific (NOWPAP), the East Asian Seas, the Baltic Sea and the Wider Caribbean regions.

[158] PAME, *Arctic Marine Pollution*, <https://pame.is/index.php/projects/arctic-marine-pollution>, accessed 5 July 2017.

[159] Thompson, R. C. et al, 'Plastics, the environment and human health: current consensus and future trends' (2009) 364(1526) *Philosophical Transactions of The Royal Society B: Biological Sciences* 2153-2166.

[160] Darnerud, P. O. et al, 'Polybrominated diphenyl ethers: occurrence, dietary exposure, and toxicology' (2001) 109(Suppl 1) *Environmental Health Perspectives* 49-68.

[161] Thompson, R. C. et al, 'Our Plastic Age' (2009) 364(1526) (27 July) *Philosophical Transactions of The Royal Society B: Biological Sciences* 1973-1976.; Holmes, L. A. et al, 'Adsorption of trace metals to plastic resin pellets in the marine environment' (2012) 160(0) *Environmental Pollution* 42-48.

Exposure to endocrine-disrupting chemicals was estimated to incur €119 billion in burden and disease costs (median range) to the European Union. [166] Some of these chemicals come into contact with food and humans daily through plastics.[167] Criteria have been proposed for endocrine disrupting chemicals by the European Commission, and was voted on by representatives of member states on 4th July 2017. The text agreed will be sent to the Council and the European Parliament. They will have three months to examine it before final adoption by the Commission.[168] Plastic materials that can come into contact with foodstuffs have also been regulated.[169] BPA has been banned to varying degrees in different States,[170] including France where the use of BPA in packaging, containers and utensils intended to come into direct contact with food is prohibited.[171]

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[162] Some of the literatures on this topic include Browne, M. A. et al, 'Microplastic—an emerging contaminant of potential concern?' (2007) 3(4) *Integrated Environmental Assessment and Management* 559-561.; Takada, H. et al, *Global distribution of organic micropollutants in marine plastics*, <http://www.algalita.org/wp-content/uploads/2014/05/SETAC_ExtendedAbstract.pdf>, accessed 6 February 2013.; Cole, M. et al, 'Microplastics as contaminants in the marine environment: A review' (2011) 62(12) *Marine Pollution Bulletin* 2588-2597.; Farrell, P. and Nelson, K., 'Trophic level transfer of microplastic: Mytilus edulis (L.) to Carcinus maenas (L.)' (2013) 177(0) *Environmental Pollution* 1-3.; Wright, S. L. et al, 'Microplastic ingestion decreases energy reserves in marine worms' (2013) 23(23) *Current biology: CB* R1031-R1033.; Wright, S. L. et al, 'The physical impacts of microplastics on marine organisms: A review' (2013) 178(0) *Environmental Pollution* 483-492.; Setala, O. et al, 'Ingestion and transfer of microplastics in the planktonic food web' (2014) 185(0) *Environmental Pollution* 77-83.; Van, A. et al, 'Persistent organic pollutants in plastic marine debris found on beaches in San Diego, California' (2012) 86(3) *Chemosphere* 258-263.; Rios, L. M. et al, 'Quantitation of persistent organic pollutants adsorbed on plastic debris from the Northern Pacific Gyre's "eastern garbage patch"' (2010) 12(12) *Journal of Environmental Monitoring* 2189–2312.

[163] Resource Futures International for the World Bank and CIDA, *Persistent Organic Pollutants and the Stockholm Convention: A Resource Guide* (2001).; Ritter, L. et al, 'Persistent Organic Pollutants: An Assessment Report on: DDT-Aldrin-Dieldrin-Endrin-Chlordane, Heptachlor-Hexachlorobenzene, Mirex-Toxaphene, Polychlorinated Biphenyls, Dioxins and Furans' in (The International Programme on Chemical Safety (IPCS), 1995).; Kefeni, K. K. et al, 'Brominated flame retardants: sources, distribution, exposure pathways, and toxicity' (2011) 19 (2011 Annual) *Environmental Reviews* 238-253.

[164] Darnerud, P. O., 'Brominated flame retardants as possible endocrine disrupters' (2008) 31(2) *International Journal of Andrology* 152-160.

[165] vom Saal, F. S. et al, 'The estrogenic endocrine disrupting chemical bisphenol A (BPA) and obesity' (2012) 354(1-2) *Molecular and Cellular Endocrinology* 74-84.

[166] Trasande, L. et al, 'Estimating Burden and Disease Costs of Exposure to Endocrine-Disrupting Chemicals in the European Union' (2015) 100(4) (2015/04/01) *The Journal of Clinical Endocrinology & Metabolism* 1245-1255.

[167] Further reading is available at: Magliano, D. J. and Lyons, J. G., *Bisphenol A and Diabetes, Insulin Resistance, Cardiovascular Disease and Obesity: Controversy in a (Plastic) Cup?*, Endocrine Society, <http://press.endocrine.org/doi/full/10.1210/jc.2012-3058>, accessed 19 May 2015.; David Feldman, M. D., *Editorial: Estrogens from Plastic—Are We Being Exposed?*, Endocrine Society, <http://press.endocrine.org/doi/full/10.1210/endo.138.5.5213>, accessed 19 May 2015.

[168] European Commission Public Health, *Endocrine Disruptors: Next steps*, <https://ec.europa.eu/health/endocrine_disruptors/next_steps_en>, accessed 24 July 2017.

[169] *Commission Directive 2002/72/EC relating to plastic materials and articles intended to come into contact with foodstuffs*, opened for signature 06 August 2002, OJ L 220, 15 August 2002, pp 18-58 (entered into force 4 September 2002) ('*EU Directive 2002/72/EC on plastic in contact with foodstuffs*') <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32002L0072>.

[170] Modern Testing Services (MTS), *Summary of Bisphenol A (BPA) Regulation (2nd Edition)*, <www.mts-global.com/en/technical_update/CPIE-018-13.html>, accessed 27 March 2015.

[171] Food Packaging Forum, *France bans BPA: Second phase of the BPA ban includes all packaging, containers and utensils coming into contact with food*, <www.foodpackagingforum.org/news/france-bans-bpa>, accessed 27 March 2015.

The recent COP for the Stockholm Convention listed commercial decaBDE, an additive flame retardant used in plastics and textiles, amongst others, recognizing its potential health and environmental impacts. As per UNEP/POPS/COP.8/13, these plastics are used in electrical and electronic equipment, wires and cables, pipes and carpets. Up to 90% of c-decaBDE consumed is used in plastic and plastics used in electronics. The remainder is used in coated textiles, upholstered furniture and mattresses. Emissions of this POP are possible over the entire lifecycle of products "but are assumed to be highest during service life and in the waste phase" with the average lifespan of a product being ten years. DecaBDE was listed without exemptions for recycling of waste containing c-decaBDE. Further regulation for the incineration practices and disposal of fly ashes will be needed to address products containing this POP gradually becoming waste in the future. The Stockholm Convention had listed tetra and pentaBDE (commercial pentaBDE) and hexa and heptaBDE (commercial octaBDE) in 2009 with specific exemption for recycling of articles that contain or may contain those chemicals. After the evaluation of the continued need for such exemptions, the Conference of the Parties noted that a number of Parties are still registered for those exemptions and urged Parties to strengthen measures for the environmentally sound management of wastes, including products and articles upon becoming wastes, containing or contaminated with BDEs.

Phthalates are a common plasticizer and have been regulated in some States.[172] The European Parliament adopted a non-binding resolution encouraging a prohibition on the recycling of products containing phthalates because of the health risk posed to staff in recycling facilities.[173] The additives used in the lifecycle of plastics are numerous and the risks to human health are not adequately reflected in legal and policy frameworks at the international and regional level. The confidentiality within production chains makes it difficult to provide useful consumer information. This is reflected in the recent study that found POPs in children's toys that were made from recycled plastics.[174] International regulation of such issues is required to strengthen domestic laws in compliance with WTO regulations. SAICM can provide a mechanism to work towards broader management at the international level of chemical addivites used in the manufacture of plastics as well as end-of-life processes such as recycling.

3.4. Gaps in solid waste management and wastewater treatment

Solid waste management has been defined as "the supervised handling of waste material from generation at the source through the recovery processes to disposal."[175]

This includes wastewater, of which it is estimated that over 80% is likely to reach the environment without adequate treatment.[176] Wastewater is a known pathway for microplastics to reach the marine environment[177] (see figure 5).

Within the 28 member States of Europe plus Norway and Switzerland (EU28+2), packaging is the largest application of plastics, yet only 39.5% was recycled (based on quantities entering recycling facilities). Of the total plastic waste generated in this region, 30.8% went to landfill.[178] In the south and east

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[172] For more on phthalates, see Product Safety Australia, *Phthalates in consumer products*, Australian Competition & Consumer Commission, <https://www.productsafety.gov.au/content/index.phtml/itemId/972486>, accessed 28 February 2016.

[173] European Parliament News, *Don't allow recycling of plastics that contain toxic phthalate DEHP, warn MEPs*, <http://www.europarl.europa.eu/news/en/news-room/20151120IPR03616/Don%E2%80%99t-allow-recycling-of-plastics-that-contain-toxic-phthalate-DEHP-warn-MEPs>, accessed 28 February 2016.

[174] DiGangi, J. et al, *POPs Recycling Contaminates Children's Toys with Toxic Flame Retardants* (IPEN, 2017).

[175] OECD, *Glossary of Statisticial Terms: Solid Waste Management.*, Glossary of Environment Statistics, Studies in Methods, Series F, No. 67, United Nations, New York, 1997, <https://stats.oecd.org/glossary/detail.asp?ID=2510 >, accessed 23 May 2017.

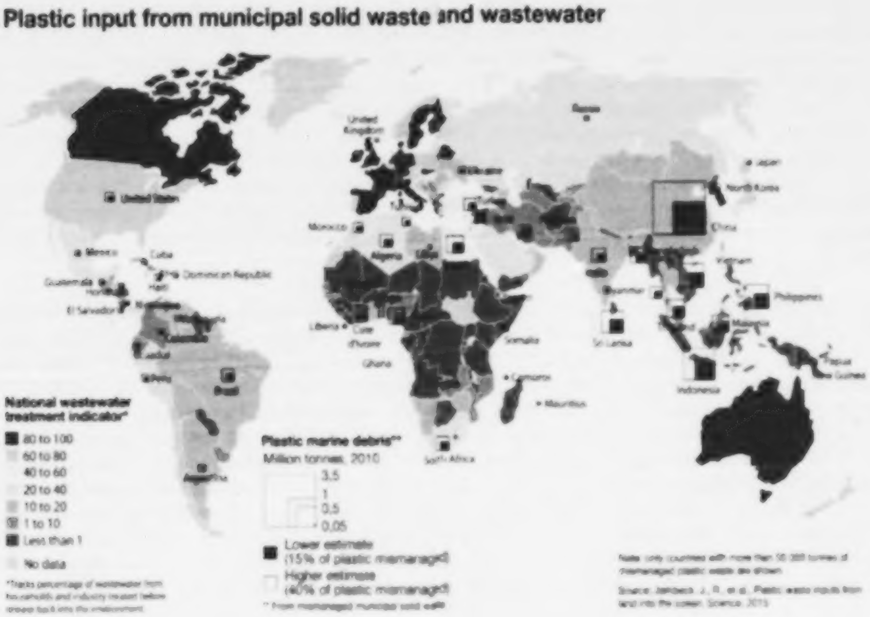
[176] UN Water, *The United Nations World Water Development Report 2017* (2017).

[177] Browne, M. A. et al, above n 7.

[178] PlasticsEurope, above n 131.

Mediterranean countries, more than 80% of landfill sites are reportedly not subject to supervision.[179] It is also estimated that worldwide over 2 billion peoplelack access to solid waste collection services and at least 3 billion people lack access to controlled wase disposal facilities.[180] An example can be found in the recent waste crisis in Lebanon that resulted in lrge volumes of plastic waste polluting the shores of neighboring countries of the Mediterranean region.[181]

Figure 6: Plastic input from municipal solid waste and wastewater


Plastic input from municipal solid waste and wastewater
United States
Mexico
Cuba
Guatemala
Honduras
Haiti
Dominican Republic
El Salvador
Nicaragua
Venezuela
Colombia
Ecuador
Peru
Brazil
Argentina
United Kingdom
Ukraine
Russia
Japan
North Korea
China
Morocco
Algeria
Libya
Egypt
Myanmar
Vietnam
Philippines
Malaysia
Sri Lanka
Indonesia
Papua New Guinea
Liberia
Cote d'Ivoire
Ghana
Somalia
Comoros
Mauritius
South Africa
National wastewater treatment indicator*
80 to 100
60 to 80
40 to 60
20 to 40
10 to 20
1 to 10
Less than 1
No data
*Tracks percentage of wastewater from households and industry treated before thrown back into the environment
Plastic marine debris**
Million tonnes, 2010
3.5
1
0.5
0.05
Lower estimate (15% of plastic mismanaged)
Higher estimate (40% of plastic mismanaged)
** From mismanaged municipal solid waste
Note: only countries with more than 50 000 tonnes of mismanaged plastic waste are shown.
Source: Jambeck, J. R., et al., Plastic waste inputs from land into the ocean, Science, 2015

Source: GRID-Arendal and Maphoto/Riccardo Pravettoni (available at www.grida.no/resources/6925)

3.4.1. International

At the global level, the 186 Parties to the Basel Convention are required to reduce their generation of waste and ensure the environmentally sound management thereof. The top 5 contributors to marine plastic debris, as per Jambeck et al,[182] are Party to the Convention. The United States, the only high-income country in the top 20, is a signatory but has not ratified the Convention. This highlights the need for more effective implementation at the domestic level of the Technical Guidelines for the identification and environmentally sound management of plastic wastes and for their Disposal (adopted by COP.6, Dec 2002), the 2002 Technical Guidelines on wastes collected from households and the 1995 Technical Guidelines on incineration on land. The new household waste partnership initiated under the Convention and the workplan for the biennium 2018-2019 (see Section 5.2) provide opportunity to guide improvements to the solid waste management services within these countries.[183]

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[179] UNEP/MAP, *Strategic Framework for Marine Litter management (UNEP(DEPI)/MED IG 20/8, Annex II, Decision IG.20/10)* (2012).

[180] UNEP/ISWA, *Global Waste Management Outlook* (United Nations Environment Programme, 2015).

[181] Arango, T. and Saad, H., *On Lebanon's Once-Sparkling Shores, a Garbage Dump Grows*, New York Times, <https://www.nytimes.com/2017/01/26/world/middleeast/on-lebanons-once-sparkling-shores-a-garbage-dump-grows.html>, accessed 3 August 2017.

[182] Jambeck, J. R. et al, above n 16.

3.4.2. **Regional**

At the regional level, solid waste management services and wastewater treatment are given greater priority in voluntary action plans than the binding instruments. Strategies for the prevention or reduction of solid waste generation and enhancements to waste treatment procedures for collection and final disposal, including recycling of waste are promoted in six LBS/A Protocols, namely the Red Sea and Gulf of Aden, the Mediterranean region, the Western, Central and Southern African Region, the Western Indian Ocean, the Black Sea (2009 revised version) and the Caspian Sea. The latter three Protocols, however, are not yet in force. In the Mediterranean region, the legally binding Regional Plan on Marine Litter Management specifically addresses the issue of solid waste management, requesting the Contracting Parties "to base urban solid waste management on reduction at source, by 2025 at latest, applying the following waste hierarchy as a priority order in waste prevention and management legislation and policy: prevention, preparing for re-use, recycling, other recovery, e.g. energy recovery and environmentally sound disposal" (article 9). In this regard, the adoption of the Regional Plan on Marine Litter Management provided an added value to the existing MAP system by putting a stronger emphasis on solid waste management, which has not been a priority in the framework of the MAP system before.

Strategies for the management of solid waste vary amongst the regions. Garbage collection and recycling are encouraged in the action plans of the Northwest Pacific, Wider Caribbean, North-East Atlantic (OSPAR), Caspian Sea, East Asian Seas region, the South-East Pacific, Black Sea and the South Asian Seas. Marine litter is rated as a low priority in the Strategic Action Programme for the Eastern Africa region despite listing inadequate collection, treatment and disposal of solid waste as a concern. The South Asian Seas region specifically mentions to avoid mixing litter with coastal sewage treatment. Only the Wider Caribbean links natural disaster planning with marine litter prevention and also encourages residents to start their own plastics recycling businesses. The Pacific Region recognizes the unique problems plastic waste presents island states, suggesting the export of recoverable material as an important strategy. To combat this, the Pacific Regional Waste and Pollution Management Strategy focuses on per capita collection services, landfill diversion rates and waste generation, targeting a 75% recycling rate by 2025. (For additional targets in regional marine litter action plans, refer to Annex 8.2.)

3.4.3. **Landfills**

The location of landfills near coastal zones and internal waterways can lead wind-blown plastic waste reaching the marine environment.[184] Locating landfills and waste dumpsites away from coastlines and waterways is mandated in the EU Landfill Directive, but is not always possible in some regions, such as small island States. A similar strategy is promoted in the Northwest Pacific Region, and the Eastern Africa region. In the OSPAR region, illegal coastal landfills and dumpsites that may be at risk from coastal erosion must be considered for action. The use of *wadis*[185] as landfills and dumps by both locals and municipalities is to be remedied in the Red Sea and Gulf of Aden region by assessing local domestic garbage collection and disposal services as well as national legislation.[186]

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[183] Other technical guidelines developed under the Basel Convention that are relevant to marine plastic litter and microplastics include the Technical Guidelines for electronic waste, Technical Guidelines on Specially Engineered Landfill (D5) (adopted by COP.3, Sep 1995) and the Technical Guidelines for the environmentally sound management of used and waste used pneumatic tyres.

[184] Allsopp, M. et al, *Plastic Debris in the World's Oceans* (Greenpeace International, 2006).

[185] A valley, ravine, or channel that is usually dry except in the rainy season.

[186] UNEP, above n 118.

3.5. Gaps in the regulation of dumping

3.5.1. International

Dumping of wastes can occur directly into the oceans or along coastal zones. Under UNCLOS, dumping within the territorial sea and the exclusive economic zone or onto the continental shelf shall not be carried out without the express prior approval of the coastal State, which has the right to permit, regulate and control such dumping after due consideration of the matter with other States which by reason of their geographical situation may be adversely affected thereby (article 210(5)). No distinction is made for plastic waste. This is given effect in the London Protocol, which prohibits the intentional dumping into the ocean of persistent plastics, as well as internal marine waters, the seabed and the subsoil thereof (article 7). The IMO has recently identified two waste streams that may contain plastics and that may be permitted for dumping under certain circumstances. These are sewage sludge and dredged material. Efforts are underway to close this gap, possibly by improving the assessment process as discussed in Section 2.

3.5.2. Regional

At the regional level, ocean dumping is prohibited under the Regional Seas Conventions in ten regions. These are the Wider Caribbean, Northeast Pacific, Baltic Sea, Caspian Sea, Western Africa, Western Africa, North-East Atlantic, Western Indian Ocean, ROPME Sea Area[187] and the Red Sea and Gulf of Aden. Protocols specific to the dumping of waste from vessels that include a prohibition on dumping of plastics have been developed for the Black Sea, the Pacific and the Mediterranean regions.

Coastal dumping and disposal is a major concern in the Red Sea and the Gulf of Aden region, but the LBA Protocol does not require member States to take any specific action in this regard other than a general obligation, as far as possible, to prevent solid waste and litter reaching the marine environment. Measures to prevent pollution of the respective convention areas from coastal disposals or dumping are required by the LBA Protocols of the Mediterranean, Black Sea, the Caspian Sea, the South Pacific, the Wider Caribbean and the West and Central African regions. Contracting Parties of the Western Indian Ocean region must only "endeavor" to prevent such pollution, whereas the Marine Litter Action Plan of the Mediterranean region places a timeline of 2020 by which Parties must enforce measures to combat illegal dumping on beaches and close illegal dumpsites. The voluntary Marine Litter Framework developed for the South Asian Seas recommends implementing mandatory financial and technical contributions from the plastics industry to control dumping along the coastline and into the sea. This framework is currently undergoing revision.

3.6. Gaps in the management of microplastics

Research has identified land-based sources of microplastics that contribute to plastic waste in the marine environment[188] (see figure 6). Microplastics also result from fishing and aquaculture activities.[189] In the case of synthetic microfibers, these may be consumed and may transfer from the guts of certain organisms to their cells and tissues.[190] As discussed in Section 2, these sources are not adequately addressed in international instruments, mostly because many instruments were developed prior to much of the research on microplastics.

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[187] These are the Coastal Areas of Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

[188] Napper, I. E. and Thompson, R. C., 'Release of synthetic microplastic plastic fibres from domestic washing machines: Effects of fabric type and washing conditions' (2016) 112(1) (2016/11/15/) *Marine Pollution Bulletin* 39-45.; Browne, M. A., 'Sources and Pathways of Microplastics to Habitats' in Bergmann, M., Gutow, L. and Klages, M. (eds), *Marine Anthropogenic Litter* (Springer, 2015) 229.

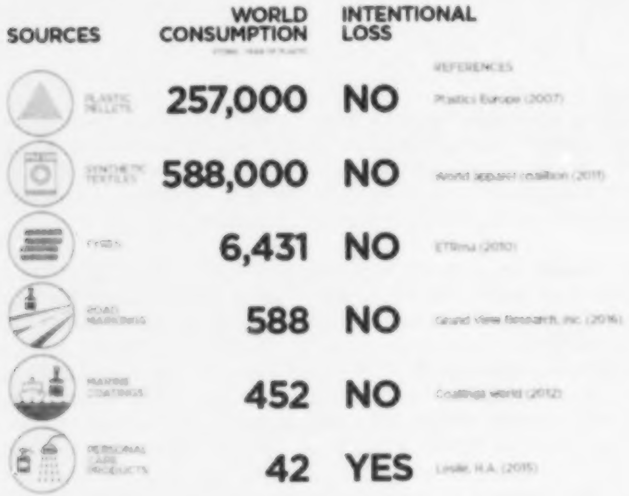
[189] FAO, above n 144; Welden, N. A. and Cowie, P. R., 'Degradation of common polymer ropes in a sublittoral marine environment' (2017) *Marine Pollution Bulletin*.

[190] Browne, M. A. et al, above n 7; Browne, M. A. et al, above n 7; Collard, F. et al, above n 7.

The Mediterranean, Baltic Sea and North East Atlantic, as well as the draft Black Sea marine litter action plan, are the only regions that reflect the increasing concern over microplastics beyond requiring research into the issue. The Marine Litter Action Plans for the Baltic and North East Atlantic regions encourage improvements to stormwater management to prevent macro- as well as microlitter from entering the marine environment. The OSPAR Marine Litter Action Plan also promotes the evaluation of all products and processes that include microplastics in order to reduce their impact on the marine environment. The Mediterranean Marine Litter Action Plan requires member States, by 2017, to cooperate with the plastics industry to reduce microplastics by minimising the decomposition characteristics of plastic.

Efforts have been underway by the resin manufacturing sector to encourage facilities to adopt Operation Clean Sweep (OCS) with a target of zero pellet loss. Additional research is required to compare the effectiveness of these efforts with the increases in plastic productivity since the 2007 figures referenced in the diagram below.

Figure 7: Estimated volumes of microplastics from land-based sources[191]



SOURCES	WORLD CONSUMPTION	INTENTIONAL LOSS	REFERENCES
PLASTIC PELLETS	257,000	NO	Plastics Europe (2007)
SYNTHETIC TEXTILES	588,000	NO	World apparel coalition (2011)
TYRES	6,431	NO	ETRma (2010)
ROAD MARKINGS	588	NO	Grand View Research, Inc. (2016)
MARINE COATINGS	452	NO	Coatings world (2012)
PERSONAL CARE PRODUCTS	42	YES	Leslie, H.A. (2015)

3.7. Regulation of industry pollution and emissions into waterbodies

Pollution can occur during all lifecycle stages of plastic products. This can include point-source pollution resulting from industrial emissions of plastic pellets, powders and additives during the manufacture and conversion processes, diffuse or non-point pollution by microplastics from the wear and tear of products during use, leakage during the disposal and collection of plastic waste and further industrial emissions during the final treatment of plastics during recycling and recovery processes.

The duty to establish water quality standards and the necessary emission limits to maintain such standards can be applied to these emissions by mandating compliance with programs targeting 100% containment of plastic pellets from the manufacturing and transport sectors. Operation Clean Sweep is a voluntary industry program that could provide the minimum standards to adopt in national legislation. Support for such measures can be found in the GPA, which specifically mentions "resin pellets used as industrial feedstocks" as a source of pollution (paras. 141-142). Signatory States are requested to take "immediate preventative and remedial action, wherever possible" (para. 5). Such actions include the separation of industrial effluent from urban wastewater and stormwater (para. 85) as well as regional harmonisation of standards for emissions and discharges of pollutants (para. 33.a). The Honolulu Strategy recommends the development of regulatory tools where voluntary efforts are not successful in preventing the release of pellets. The G-7 Action Plan to Combat Marine Litter (2015) suggested a target of zero pellet loss throughout the plastics manufacturing value chain from production to transport.

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[191] Boucher, J. and Friot, D., *Primary Microplastics in the Oceans: a Global Evaluation of Sources* (International Union for Conservation of Nature (IUCN), 2017).

There is potential to apply water quality standards to the design phase of plastic products to ensure that loss of microplastics through wear and tear during the use of products comply with such standards. Microplastics generated in this way can also be transported through air and the same compliance measures could therefore apply to the design phase of products in order to meet air quality standards.

The establishment of water quality standards is required in the LBA Protocols of Western Indian Ocean region, Western, Central and Southern African region, the Red Sea and Gulf of Aden region and in the EU under the EU Water Framework Directive. The latter does not include any measures specific to marine plastic litter and microplastics, but the EU Directive on Bathing Water Quality lists plastic waste as one of the water quality parameters to be regulated, although only plastic waste that is visible which would not include microplastics.

3.8. Due diligence within the plastics industry

Section 2 has shown that the principles of environmental impact assessment (EIA) and extended producer responsibility (EPR) are not adequately applied within the binding frameworks to the prevention of marine plastic litter and microplastics. UNCLOS requires States to observe, measure, evaluate and analyze the risks or effects of pollution of the marine environment as far as practicable, and keep under surveillance the effects of activities to determine if they are likely to cause such pollution (article 204). When States have reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment, they shall, as far as practicable, assess the potential effects of such activities on the marine environment and communicate reports of the results.[192] In contrast, the 1991 Protocol on Environmental Protection to the Antarctic Treaty requires activities to be assessed on "whether they have a minor or transitory impact on the environment."[193]

The **Convention on Environmental Impact Assessment in a Transboundary Context**[194] requires States to notify and consult on major projects that may have a significant impact across boundaries.[195] Activities listed under Annex I that are subject to an EIA do not include the manufacture, transport, use or treatment of plastic waste. The **Strategic Environmental Assessment (SEA) Protocol to the Espoo Convention** applies to planned *activities* (Annex III.2) in addition to *plans and programmes* (article 4.2), including waste and water management, and, in a more limited way, to policies and legislation (article 1.b). In contrast to UNCLOS and other instruments, the Espoo Convention specifies the minimum requirements for EIA documentation and procurement, including the required content or documentation of impact assessments, and the procedural steps.[196] There are 45 Parties to the Espoo Convention, mostly UNECE Member States, and 32 Parties to the Protocol on SEA. The geographic scope of these instruments and contribution to SDG 14.1 is therefore limited. Through its first amendment, the Convention has turned from a regional to a global instrument allowing for accession by Member States of the United Nations outside the UNECE region. The Protocol on SEA, although negotiated at the regional level, was from the beginning open to accession by any State Member of the United Nations.

Most EPR programmes are implemented as a financial tool that makes producers responsible for the "take back" or dismantling of their products, thus alleviating the waste management burden borne by local authorities. This additional cost to the producer can be passed on to the consumer or distort markets. Programmes may also require collection services that are standard across the distribution of the product within a country, or that are not available in developing countries.[197] The selection by manufacturers of the most efficient waste processors and recyclers has seen smaller players pushed out of the market. The updated OECD Guidance on Extended Producer Responsibility suggests international harmonization of incentives for environmentally friendly design are needed, giving the example of the EC Directive on Restrictions on Hazardous Substances as an example of a stimulus for global change in product design.[198] The online tool enables all sectors of the apparel industry to generate a performance score that can be shared and benchmarked within the industry, providing an incentive to strive for more sustainable practices.

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[192] 1982 Law of the Sea Convention., Arts. 204-206.

[193] *Protocol on Environmental Protection to the Antarctic Treaty of 1 December 1959*, opened for signature 4 October 1991, 402 UNTS 71 (entered into force 14 January 1998) ('*Madrid Protocol*') <https://www.ats.aq/documents/recatt/Att006_e.pdf>. Arts. 3.2, 8; Annex I.

[194] *Convention on Environmental Impact Assessment in a Transboundary Context (ECE/MP.EIA/21)*, opened for signature 25 February 1991, 1989 UNTS 309 (No. 34028) (entered into force 10 September 1997) ('*Espoo Convention*') <http://www.unece.org/index.php?id=40450&L=0>.

[195] Ibid, article 2.7.

[196] Ibid, Appendix II

EIA is a difficult concept to apply to diffuse sources of plastic waste. Further research into the role EIA can play throughout the lifecycle of plastics could provide practical applications for industry. This could include the development of international design criteria for plastic products that aim to eliminate the release of microplastics from wear and tear, where appropriate. Products and their components could also be designed to meet globally agreed recycling standards, as well as be designed for reuse and repair. An example of industry measuring the environmental impacts during the lifecycle of a product range is the Higg Index initiated by the Sustainable Apparel Coalition.[199] However, the efforts of industry in all cases must be subject to independent scientific review to ensure methods and measurements are valid and effective.

3.9. Recognition of differences in capacity

Some countries, especially developing countries, lack the standards, legislation and regulations to implement upstream interventions or the required waste management services, including port reception facilities. Significant capacity support will be needed to develop their legislative frameworks and to conduct periodic monitoring and evaluation in order to comply with reporting requirements. As noted in Section 2, most global instruments include cooperation through capacity building. Greater focus in this regard could be given to improvements in national policy and legislation for, inter alia, solid waste management processes, public-private partnerships, extended producer responsibility programmes and improved national reporting. (See Section 5 option 3 for further discussion.)

3.10. The role of industry and current trends

The plastics industry has recognized the impact of their products on the marine environment. Examples of efforts by industry are given below. When considering the plastics industry, it is important to recognize the role each sector plays in the contribution and solutions to the problem of marine plastic litter and microplastics. Not all sectors involved in producing a product are visibly branded on the product, which can distort public perception of accountability. Other industries also play a role, such as the tourist industry.

Sectors within the plastics industry include resin manufacturers, converters that produce plastic products, brand owners that market the products, retailers that sell plastic products to the consumer, as well as private and public collection and sorting services, recycling facilities and recovery facilities. The various sectors are represented within regional and international associations and the issue of marine litter is on the agenda of most of these forums. The industry is engaging with scientists, NGOs, government authorities and other stakeholders to understand the issues and work towards solutions. Millions of dollars have been invested in recycling, waste management and cleanup programmes across the globe.

In addition to regulatory frameworks, partnerships between the public and private sectors can assist in developing strategies to combat marine plastic litter and microplastics on a national and international level. Examples are the voluntary agreements in the Netherlands, known as "green deals," which involve private and public sectors.[200] NGO initiatives have also led to action by industry, such as the phasing out of microplastics in cosmetic care products due to campaigns such as "Beat the Microbead."[201] It should be noted that with all efforts by industry and NGOs, consideration must be given to the level of scientific analysis within such projects to ensure robust evidence of actual reductions in emissions and impacts of marine plastic litter and microplastics.

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[197] OECD, *Extended Producer Responsibility: Updated Guidance for Efficient Waste Management* (OECD Publishing, 2016).

[198] Ibid

[199] Sustainable Apparel Coalition, *The Higg Index*, <http://apparelcoalition.org/the-higg-index/ >, accessed 19 June 2017.

3.10.1. Examples of industry efforts and programmes

The net environmental benefits of plastics were the subject of a study by Trucost Plc entitled *Plastics and Sustainability: A Valuation of Environmental Benefits, Costs, and Opportunities for Continuous Improvement*. The Plastics Division of the American Chemistry Council (ACC) supported this study. The report concluded that the use of traditional alternative materials in consumer goods and packaging would result in environmental costs four times higher than the use of plastics would incur.[202] To reduce the overall costs of plastics, recommendations were made to reduce the impacts of electricity and transport during the production of plastics, design efficiencies in packaging and increased recycling and energy conversion once plastic products reach end of life.

Although this industry-supported report highlights some of the benefits of plastics in the context of climate change, it also notes that the "environmental cost to society of consumer plastic products and packaging was over $139 billion in 2015, equivalent to almost 20% of plastic manufacturing sector revenue, and is expected to grow (to $209 billion by 2025) if current trends persist." The methodologies of this study were "broad stroke" and the results were applied to a wide range of plastics. The study does, however, highlight some of positive services plastics provide to society, but it must also be recognized that once plastics become waste in our oceans, their lifespan as waste and the environmental impacts are likely to extend far beyond most alternative materials. The efforts underway by the industry to improve waste management services will assist in mitigating this by preventing leakage into the environment.

Marine Litter Solutions is an example of a collaborative forum established by the plastics industry.[203] The program aims to encourage and increase recycling and recovery, foster local, regional and global partnerships, promote better product stewardship, as well as increase ocean pollution cleanup and marine litter prevention programs. The latter includes the prevention of pellet loss. The Global Declaration of the Plastics Associations for Solutions on Marine Litter was adopted in 2011 and now spans 35 countries with 69 plastics organizations and allied industry associations participating.

The Virtuous Circle[204] is a pilot project that partners industry and NGOs to find solutions to the issue of multilayer packaging, traditionally a difficult plastic application to recycle. Coordinated by DuPont, the project provides underprivileged schoolchildren with a nutritious meal that is uniquely packaged for this specific purpose. The packaging is collected and recycled into school desks.

Other industry efforts include research into local communities in South East Asia to profile waste generation. The objective is to identify gaps in available waste management processes and infrastructure that do not provide for regionalized consumption practices and behavior.

Industry is increasingly working with various NGOs to seek solutions to the problem of plastic waste in general. The Ocean Recovery Alliance launched the Plastics Disclosure Project,[205] modeled on the Carbon Disclosure Project and, similar to the Higg Index initiated by the Sustainable Apparel Coalition, aims to incentivize improvements in design and waste management strategies. Annual reporting is voluntary and provides elements of risk assessment for investors.

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[200] Dutch Central Government, *Green Deal - English*, <http://www.greendeals.nl/english/>, accessed 22 June 2017.

[201] Plastic Soup Foundation, *Beat the Microbead*, <http://www.beatthemicrobead.org/>, accessed 19 June 2017.

[202] Trucost Plc, *Plastics and Sustainability: A Valuation of Environmental Benefits, Costs and Opportunities for Continuous Improvement* (2016).

[203] Marine Litter Solutions, *Solutions for Our Oceans*, <www.marinelittersolutions.com >, accessed 19 June 2017.

[204] The Virtuous Circle, *The virtuous circle - food security, packaging & sustainable development*, <www.thevirtuouscircle.co.za >, accessed 23 June 2017.

[205] Plastics Disclosure Project, *Plastics Disclosure Project*, <http://plasticdisclosure.org>, accessed 22 June 2017.

The World Wildlife Fund (WWF) initiated a Cascading Material Vision that seeks to increase the reuse of secondary materials by breaking down the barriers to sourcing the required quality and quantities to make such practices sustainable. A number of organisations within the plastics manufacturing sectors have signed up to the Vision.[206]

The Ellen MacArthur Foundation has initiated a three-year program partnering with some of the larger industry stakeholders to apply the principles of the circular economy.[207] The initiative aims to stimulate, amongst others, the design of materials and formats that reduce the environmental impacts of plastics, particularly from packaging applications.[208] Unilever, a partner in this program, has committed to ensuring 100% of its plastic packaging is "fully reusable, recyclable or compostable" by 2025.[209]

3.10.2. **Microplastics**

The resin-manufacturing sector developed Operation Clean Sweep (OCS)[210] in response to the leakage into the environment of industrial pre-production plastic pellets. OCS is a voluntary industry stewardship program that has been in place for 25 years and is implemented in 23 countries. The Plastics Industry Association (PLASTICS) and the American Chemistry Council (ACC) administer the program. A loyalty-free license is provided that allows associations to promote adherence with the program amongst their members. The aim is zero pellet, flake and powder loss into waterways.

Some discussions have taken place between the manufacturing sectors and scientists on the design of stronger materials to prevent the generation of microplastics from wear and tear during product use. Solutions may include designing a more durable product but may require incorporating additional plastic material to achieve this. A balance will need to be found between the net environmental costs of increased product durability (should they enter the marine environment) and the environmental benefits achieved in previous years through targeted reductions in plastic material, particularly for packaging. An example of such reductions in material is the estimated 30-50% decrease in the weight of PET plastic water bottles.[211]

3.10.3. **Recycling and international trade in plastic waste**

The profitability of recycling is a challenge for many types of plastics. End-markets for recycled plastics may fluctuate for a number of reasons. Other challenges presented by the reuse of post-consumer plastic include poorer quality resulting in cracking and color variations. Industry associations are attempting to demonstrate the economic viability of recycling with the aim of replicating projects in other areas. Incorporating plastics with lower end-market value may not always provide the desired profits, but brand owners may recognize the intangible benefits of meeting green criteria for eco labels by doing so, thereby improving their market perception.

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[206] WWF, *Cascading Materials Vision and Guiding Principles*, <https://www.worldwildlife.org/publications/cascading-materials-vision-and-guiding-principles>, accessed 12 July 2017.

[207] Ellen MacArthur Foundation, *New Plastics Economy*, <https://www.ellenmacarthurfoundation.org/programmes/systemic-initiatives/new-plastics-economy>, accessed 25 July 2017.

[208] World Economic Forum, Ellen MacArthur Foundation and McKinsey & Company, above n 132.

[209] Unilever, *Unilever commits to 100% recyclable plastic packaging by 2025*, <https://www.unilever.com/news/press-releases/2017/Unilever-commits-to-100-percent-recyclable-plastic.html>, accessed 2 October 2017.

[210] American Chemistry Council, *Operation Clean Sweep*, <https://opcleansweep.org/ >, accessed 12 June 2017.

[211] Packaging World, *PET water bottles: recycling grows, while weight drops*, <https://www.packworld.com/article/sustainability/recycling/pet-water-bottles-recycling-grows-while-weight-drops>, accessed 28 July 2017.

China is the biggest market for the recycling and reprocessing of scrap. Many bales exported to China were contaminated with waste that was not optimal for recycling. As an enforcement of existing environmental law, China implemented the Green Fence policy in 2013 to reduce contamination of imported bales of plastic waste. This resulted in China receiving higher quality bales, but also resulted in plastic waste increasingly being exported to South East Asian countries. In February 2017, China announced the National Sword policy, which will ban the imports of many post-consumer scraps, including plastics,[212] and close recycling factories that do not comply with the existing environmental standards. The new policy aims to promote the recycling of plastic waste generated in China over imported waste. With China importing around 8 million tons of plastic scrap annually, amounting to over 60% of the global trade in plastic waste,[213] the effects of National Sword on recycling industries in different countries and on the international trade of plastic waste are yet to be seen. Concerns have been raised to the WTO by various waste management associations, requesting further clarification of the new regulations submitted by China, questioning the need for the aggressive controls introduced and requesting an extension on the deadline.[214]

3.10.4. **Plastic recovery in other sectors**

The use of plastic waste in sectors other than the plastics industry can reduce the need for extraction of oil, gas, lumber and other resources. For example, energy generation from the incineration of plastic waste has been considerable in some regions. Plastic waste is being used to reduce the need for, inter alia, virgin lumber and fossil fuels. Other examples of post-consumer plastic use include construction, roads, packaging pallets, furniture and textiles. Although not a long-term solution to marine plastic litter and microplastics, these technologies may serve as interim approaches or a structured hierarchical suite of solutions provided they are environmentally sound.

When discussing the various treatment options for end-of-life plastics, incineration is a term often used in a broad sense to include newer technologies such as pyrolysis and gasification. The American Chemistry Council commissioned a report by the Ocean Recovery Alliance on trends in the plastic-to-fuel industry. The report highlights the regulatory, technical and logistical constraints that require attention to enable pyrolysis to contribute to the objective of creating value from plastic waste.[215] Emerging technologies may be less polluting than waste treatment processes currently in use and must be considered in the suite of solutions.

In accordance with the circular economy principles and the EU Waste Hierarchy, incineration of plastics should only be considered as a last option, particularly incineration without fuel generation. It is possible that policy designed for economic growth within a circular economy may not achieve the greatest potential reductions in environmental impacts. Long-term solutions must adapt to the long-term capacity, feedstocks and needs of individual countries and communities. An example can be found in many SIDS where over 50% of the waste stream can be organic matter and the generation of plastic waste is likely to be insufficient to sustain expensive waste-to-energy facilities. Care must be taken to ensure communities are not locked in to high cost/high tech solutions that are detrimental to the preferred approaches of reduction, reuse and recycling.

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[212] The types of plastics to be banned include Plastic waste from living sources: 3915100000; 3915200000; 3915300000; 3915901000; 3915909000. See World Trade Organization, *Regular notification G/TBT/N/CHN/1211*, G/TBT/N/CHN/1211s, (Regular notification G/TBT/N/CHN/1211) http://tbtims.wto.org/en/RegularNotifications/View/137356?FromAllNotifications=True>.

[213] Recycling International, *Plastics recyclers struggling with shipping cost and image issues*, <http://www.recyclinginternational.com/recycling-news/10546/plastic-and-rubber/global/plastics-recyclers-struggling-shipping-cost-and-image-issues>, accessed 25 May 2017.

[214] These include the Bureau of International Recycling (BIR), Institute of Scrap Recycling Industries Inc (ISRI), National Waste & Recycling Association (NWRA), Solid Waste Association of North America (SWANA).

[215] Ocean Recovery Alliance, *2015 Plastics-to-Fuel Project Developer's Guide* (2015).

3.10.5. Policies and legislation

The various sectors of the plastics industry are mostly not in favor of bans and taxes, except those that divert plastic waste from landfill. Instead, legislation should assist in redefining plastic waste as a resource. Market-based instruments that incentivize the establishment and innovation in collection, recycling and recovery processes are supported. The contribution of "pay-as-you throw" policies to reduce the generation of plastic within municipal solid waste[216] is recognized.

There is conceptual support for legislation that mandates a percentage of recycled content in products, where feasible. Plastics that come into contact with food, however, may present challenges due to the expense of processing requirements to meet current standards for food packaging. There is also support for labeling systems that educate consumers on how to recycle a product, e.g. the How2Recycle[217] "caps on" message for bottles (already adopted by some manufacturers[218]) or labeling that indicates the environmental standards the product has met (e.g. recycled content an ease of recycling). Listing the content of products is likely to meet resistance from the industry.

Extended producer responsibility in the form of take-back schemes (e.g. mattresses) are not popular within the plastics industry. There is a sense such schemes are expensive to operate and do not achieve the desired outcomes. Smaller, less efficient operators can be pushed out of the market. Regulations such as the Directive 2000/53/EC on End-of-Life Vehicles[219] are thought to limit the use of innovative materials that make vehicles safer while reducing their overall environmental impact. This Directive requires new vehicles to be reusable and/or recyclable to a minimum of 85% by weight per vehicle or reusable and/or recoverable to a minimum of 95% by weight per vehicle. New materials that could contribute to safety and reduced overall environmental impact may not yet be recyclable and can therefore not contribute to the design of new cars under this Directive.

3.10.6. General trends

Industry efforts tend to favor the establishment and economic sustainability of end-markets for plastic waste. The trend for supporting sustainable production and consumption of plastics is therefore to create a value for all plastic wastes. Recycling and recovery are regarded as the solutions to marine plastic litter and microplastics. This in turn will drive collection and sorting services and attract private sector investment. The focus of the various industry associations is on establishing viable solutions for packaging waste, building and construction waste, medical waste preventing leakage during transportation, with an increasing interest in agricultural waste.

There is room for greater recognition by the plastics industry of the increasing concerns of microplastics and chemical additives. For microplastics, the solutions are mostly limited to containment of pre-production plastic pellets and microbeads in facial scrubs and not microfibers, which are found in greater numbers across the world's oceans.[220] Recognition of the smaller micrometer sized plastic contaminants is in its infancy and further collaboration between scientific community, industry and policymakers is required.

Independent laboratories often conduct lifecycle assessments of new products before release to market. These assessments should consider the full potential market penetration of a product as well as the required end-of-life services and infrastructure available in the different regions of intended sale. A scheme to certify laboratories could assist in standardizing such assessments and preventing products entering the market that include additives or design elements with higher risk potential for harm to human health or the environment. In addition, the production of off-specification plastics has led to inferior plastics entering the market and reducing the quality of recycled materials. Stricter enforcement of these resin-manufacturing facilities is required.

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[216] US Environmental Protection Agency, *Pay-As-You-Throw*, <https://archive.epa.gov/wastes/conserve/tools/payt/web/html/index.html>, accessed 12 July 2017.

[217] Sustainable Packaging Coalition, *A Cleaner World Starts With Us*, <http://how2recycle.info/>, accessed 22 June 2017.

[218] Plastics News, *Nestlé puts a 'caps on' recycling message on its bottles*, <http://www.plasticsnews.com/article/20170814/NEWS/170819953/nestl%C3%A9-puts-a-caps-on-recycling-message-on-its-bottles>, accessed 26 August 2017.

[219] *Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles*, OJ L 269, 21.10.2000, pp. 34-43 (entered into force 21 October 2000) ('*Directive 2000/53/EC on End-of-Life Vehicles*') <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM:l21225>.

[220] Browne, M. A., above n 189; Browne, M. A. et al, above n 7.

Many industry initiatives will require scientific support to verify the methodologies employed for monitoring results. Credible independent evaluation can determine the overall scale of impact at the national and international level. These efforts by industry do, however, show recognition of the issues presented by plastic products, particularly once they become waste and enter the environment. Industry iniatives should further encourage alignment of international, regional and sub-regional legal and policy frameworks with the desire of industry to work towards solutions. The internalization of the costs currently borne mostly by society and the public sector must be a collaborative effort between industry, the scientific community, policymakers, NGOs and other relevant stakeholders.

4. The cost of damage and remediation

Marine plastic litter and microplastics are mostly non-point source pollutants that enter watercourses from multiple sources making its impacts felt in both river and sea environments. The increase in mankind's use of plastics has led to marine litter being more residual in both our terrestrial and marine ecosystems.[221] Microplastics are now observed in nearly all maritime zones and the associated impacts may have potential human health implications via the consumption of marine species.[222]

As in any form of pollution, plastic waste is emitted due to producers and users being allowed to externalize the full costs (social, economic and environmental) of production, thus avoiding the costs associated with any resulting damage from the pollutant and the costs of waste remediation. Costs are then borne by the environment, rather than production being a fully costed system. The response to these externalities requires legislation that makes the polluter pay the full costs of their activities as a form of abatement. However, failing this, society is left with the pollutant damage and remediation costs, especially when the pollutant is not easily linked to the industrial producer as in non-point sources of marine plastic litter and microplastics.

The diagram below (figure 7) illustrates the regional differences in sources of marine plastic litter and microplastics, differentiating between the two major source categories of land-based sources and the main sea-based sources of fishing gear and shipping.

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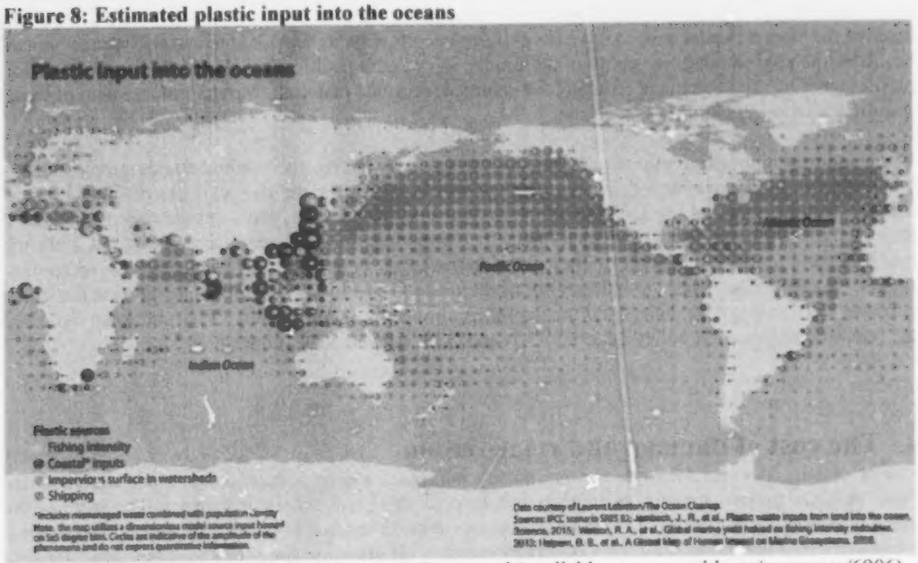
[221] Andrady, A. L., 'Microplastics in the marine environment' (2011) 62(8) *Marine Pollution Bulletin* 1596-1605.

[222] Browne, M. A. et al, above n 162.

Figure 8: Estimated plastic input into the oceans


Plastic input into the oceans
Pacific Ocean
Atlantic Ocean
Indian Ocean
Plastic sources
Fishing intensity
Coastal* inputs
Impervious surface in watersheds
Shipping
Data courtesy of Laurent Lebreton/The Ocean Cleanup
Sources: IPCC scenario SRES B2; Jambeck, J. R., et al., Plastic waste inputs from land into the ocean, Science, 2015; Watson, R. A., et al., Global marine yield halved as fishing intensity redoubles, 2013; Halpern, B. S., et al., A Global Map of Human Impact on Marine Ecosystems, 2008.

Source: GRID-Arendal and Maphoto/Riccardo Pravettoni (available at www.grida.no/resources/6906)

In the case of marine plastic litter the observed pollution levels on shorelines have been increasing[223] and the immediate response is to determine the extent of damage and to attempt to lower the levels of marine plastic litter through remedial cleanup. However, remedial action has historically treated marine plastic litter as a failure of solid waste management systems and must progress to a more systemic upstream approach to prevent debris entering watercourses and the marine environment. Prevention can bring economic benefits through reducing the costs to industries as well as environmental damage, which are "avoidable costs."[224] However, there is little evidence that current policy and governance systems have developed beyond treating marine plastic litter as a waste remediation issue where debris is removed on a needs basis such as when a municipal authority finds that litter on one end of a beach deters tourism and the associated income. The costs of cleanup are rarely explicitly calculated so as to be considered essential to meet the immediate problem.

4.1. The cost of damage from marine plastic litter and the economic benefits from prevention.

Marine plastic litter is man-made, is diverse in its forms and presents different types of damage. There have been many studies documenting the damage arising from this pollutant.[225] The damage can be to users of watercourses, harbors or the ocean, such as vessels impacted by plastics entangled in propellers and water intakes. Other damage is visual and sanitary with marine plastic litter gathering in hot spots and on beaches, compromising user and tourism amenity. Environmental damage occurs where plastics cover sea floors and reefs, potentially damaging ecosystem functioning and reducing the services provided. Damage can also be related to the type of marine litter, for example abandoned, lost and discarded fishing gears versus plastics found in municipal waste.

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[223] Willoughby, N. G. et al, 'Beach litter: an increasing and changing problem for Indonesia' (1997) 34(6) (1997/06/01/) *Marine Pollution Bulletin* 469-478.; Barnes, D. K. A. et al, 'Accumulation and fragmentation of plastic debris in global environments' (2009) 364(1526) *Philosophical Transactions of The Royal Society B: Biological Sciences* 1985–1998.

[224] McIlgorm, A. et al, above n 18; McIlgorm, A. et al, above n 18.

[225] GESAMP, *Sources, fate and effects of microplastics in the marine environment: a global assessment*, Rep. Stud. GESAMP No. 90 (IMO/FAO/UNESCO-IOC/UNIDO/WMO/IAEA/UN/UNEP/UNDP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection, 2015).

Valuations of the costs of damage estimate the value of the impacts on marine industry users.[226] Damage can be estimated as a fraction of the gross domestic product (GDP) of the marine economy and was estimated to be $1.26bn per annum to marine industries in the Asia Pacific region.[227] UN Environment estimates the damage to marine environments globally to be at least $8billion per annum.[228] The costs of damage to the environment require the estimation of a "damage function" relating the level of marine plastic litter to the impacts on the environment or ecosystems in question. This has not been costed globally as it requires data on the monetary value of the environment and ecosystem services, which are not currently available. The environmental damage function can also relate the types of chemical additives in different plastics to their potential harm and hence we can infer higher damage costs estimates for more hazardous plastics.

The cost estimates of the damage from marine plastic litter fill an important informational role in relating the dimension and seriousness of the problem to government and to the political system for action, gaining greater attention the larger the monetary value. However, the damage costs are all economic losses to the economy that are potentially avoidable costs, meaning prevention of marine plastic litter can reduce the amount of economic resources being consumed by damage and increase the benefits from environmental and ecosystem flows. Prevention can also reduce the costs of remediation, which are another layer of costs attributable to removing the marine litter.

4.2. The Cost of Remediation

The traditional response to marine litter has been to spend funds on cleaning up the litter. At the municipal level beach cleanup takes place to maintain the visual and tourism amenity of beaches.[229] Harbors collect marine litter as part of the costs of providing safe ship berths. The endemic nature of marine litter has seen investment expenditure by municipalities and port authorities on towable beach cleaning and harbor skimming equipment to remove the presenting waste debris problem.[230] Economic investment in preventative measures yielding lasting benefits through time and reducing the need for costly remediation is desirable. However, the immediate need in many regions is cleanup, presenting an important expenditure and investment choice between remediation and/or prevention.

The distributive aspects of the marine litter remediation issue involve the cost of cleanup and which sectors of society bear these costs. The industries producing plastic tend to be absent from remediation discussions as they are land based and separate from where the damage is observed at sea. Linking the costs of coastal and ocean remediation to the land based plastics industry, or to other waste industries creating debris, remains a challenge for environmental governance.

National governments tend to delegate remediation to municipal or local authorities and often there is not a clear designation of a single national agency responsible for marine plastic litter prevention and remediation. Internationally marine litter remediation can have transnational aspects and "cost sharing" of remediation between nations may be considered more efficient. Remediation is also linked to waste services. Schemes to pay fishermen to catch and return derelict fishing gear have apparently been effective in retrieval of fishing gears at a cost less than by equivalent government remediation services, but this is not a sustainable system nor does it send the required messages to polluters to reduce the problem. Perverse incentives may also be induced by subsidization to promote remediation.

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[226] McIlgorm, A. et al, above n 18.

[227] Ibid.

[228] UNEP, *Valuing Plastics: The Business Case for Measuring, Managing and Disclosing Plastic Use in the Consumer Goods Industry* (United Nations Environment Programme, 2014).

[229] GESAMP, 'The State of the Marine Environment' in ((IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), 1990) vol Rep. Stud. GESAMP No. 39, 111 pp.

[230] McIlgorm, A. et al, above n 18.

4.3. Towards a new economic paradigm

The current unacceptable levels of marine litter in the oceans require consideration of future policy pathways with cost and benefit implications.

(i) The current situation represents a costly use of resources to clean up marine litter waste with little apparent improvement;

(ii) Stronger legislation coupled with more effective governance and enforcement is needed to lead to new approaches that promote investment in plastic and debris pollution abatement and mitigation as opposed to long-term recurrent expenditure on remediation. There are economic benefits in investing in prevention in order to reduce the costs of damage and remediation in the future, but only if polluters are controlled by having to limit and preferably pay for their emissions. This will require tougher legislation, enforcement and involvement of the polluting industries in finding ways to mitigate marine plastic litter and microplastics. This requires clear identification of the industries involved and relationship between producers and the final impacts of the pollutant.

There is not always a clear link between the emitter and the location of the damage. Sources are not specific and damage costs can be borne in different regions from those of production. When in the sea, one country's litter can impose costs on another as currents and winds are an important vector for the pollutant. Marine plastic litter is an issue affecting sovereign territories but also the global commons, calling into question the principle of protecting the common heritage of mankind. A global fund may be prudent to share costs, particularly for countries in need of assistance, and address such potential intergenerational inequities that may arise from ineffective global governance attempts. A common global fund would benefit the non-market values of the marine environment, giving effect to the "moral" imperative to protect our oceans from plastic waste.

The approach must progress from the seas being the recipient of debris waste towards an approach of internalizing the costs of industry under the polluter pays principle. In the case of marine plastic litter, the plastics and waste industries have to both be made aware and held accountable for the environmental impacts arising from their plastic and waste products. On land the waste and wastewater treatment industry must prevent plastic and other waste debris entering the watercourse requiring much tougher regulatory enforcement by government. On sea, the shipping industry, including cruise ships, and the fisheries and aquaculture sectors must be made aware of their responsibilities in marine litter generation and, accordingly, contribute to solutions by prevention and by participation in financing of remediation schemes.

The costs of remediation for environmental damage by marine plastic litter and microplastics are not currently represented in any product or any other liability legislation with potential compensatory arrangements for environmental damage. Extended producer liability and any other appropriate schemes (e.g. liability and financial compensation schemes for the shipping sector) needs to be used to induce change in the plastic producing industries.

The economics and cost arguments can also benefit from the 6R approach (reduce, redesign, refuse, reuse, recycle, recover) through decreasing the amount of plastic in society. The costs and availability of alternatives to plastic products are important, as are the costs and economic viability of recycling of different types of plastic found in marine litter. There are also alternatives to recycling, such as incineration, but these have associated environmental issues. Investment in long-term infrastructure with the associated contracts that lock-in singular waste diversion streams must be carefully evaluated and balanced against the ecological outcomes desired.

Recent laboratory research on plastics has shown that ingested plastic may transfer chemicals (additives and sorbed pollutants) to the tissues of organisms giving rise to toxicological effects.[231] Chemical pollutants such as POPs may transfer to and bioaccumulate in seafood and possibly in humans with potential negative health impacts.[232] If these links are further confirmed the policy imperative to protect human health would require prioritization of a strategically funded approach to prevent marine plastic litter and microplastics entering the oceans. This will require expenditure and investment in new international governance arrangements and include the plastics and waste industry sectors. Costly remediation of high-density on-beach or near-shore plastic litter accumulations may be considered essential to deplete the current stocks of plastics in the oceans. However, care must be taken that such efforts do not result in further ecological impacts due to e.g. organisms being removed along with the plastic. This highlights the need to progress to more preventative policy solutions.

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[231] Browne, M. A. et al, above n 7.

Reliable cost data estimates of damage to industry, cost of remediation and costs imposed on the environment are not available. A cost-benefit analysis of investment options would not only benefit from a valuation of the potential costs to human health, but also from the risks associated with long-term food security. Research is ongoing into the impacts of marine plastic litter, microplastics and additives on the population growth of commercial marine stocks, and the projected effects on marine assemblage and population levels is still relatively unknown.[233] Valuing the risk factors for both food security and human health are key catalysts in prioritizing the necessary public and private funding required for a holistic approach to long-term preventive measures including improved legal and policy frameworks that support the 6R approach as well as the Green and Blue Economy.

5. Legal and Policy Options for Consideration

Paragraph 21 of resolution UNEP/EA.2/Res.11 on Marine Plastic Litter and Microplastics has opened the "policy window" and offers the international community a springboard with which to boldly and significantly alter the world that future generations will inherit. It is a unique opportunity to consolidate all the principles of Sustainable Development into one global problem that affects all environmental compartments and risks human health and food security.

To achieve this will require comprehensive implementation of the call to action resulting from the United Nations Conference to Support the Implementation of Sustainable Development Goal 14 of the 2030 Agenda entitled "Our ocean, our future: call for action," particularly suggestions to implement long-term and robust strategies to achieve a considerable reduction of marine litter, including by partnering with stakeholders at relevant levels to address their production, marketing and use.[234] A call was also made to build on existing institutions and partnerships to achieve the actions.

The suite of solutions required to combat marine plastic litter and microplastics will be greater than these efforts and will require active participation of industry to reduce the impacts and costs of plastics to the environment. There are many positive contributions of plastics to society, but the requirements of industry for innovation and market penetration must be reconciled with the objectives of the legal frameworks to protect the environment and human health.

The current governance strategies and approaches and their gaps have been discussed in this assessment and some of the concerns of industry sectors have been highlighted. This section presents progressive legal and policy options that aim to integrate industry sectors into the design of policy. The options aim to address the gaps identified and the financial burdens discussed in Section 4. The current governance strategies and approaches applicable to the prevention, mitigation and removal of marine plastic litter and microplastics mapped in Section 2 are taken into account in these options, as have scientific research and changing global priorities. The aim is to improve the management of the full lifecycle of plastics globally.

Three options are provided for consideration and summarized in Table 7:

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[232] Lithner, D. et al, 'Environmental and health hazard ranking and assessment of plastic polymers based on chemical composition' (2011) 409 *Science of The Total Environment* 3309-3324.

[233] FAO, above n 144.

[234] *Our ocean, our future: call for action (adopted by the General Assembly on 6 July 2017),* A/RES/71/312, 71, (Our ocean, our future: call for action) http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/71/312&Lang=E>., action i

1. **Maintain the status quo and continue current efforts.**
2. **Review and revise existing frameworks to address marine plastic litter and microplastics and add a component to coordinate industry.**
3. **A new global architecture with a multilayered governance approach, combining legally binding and voluntary measures.**

Consideration must be given to geographic and cultural differences, the role of the private sector and the regional variations in available funds for implementation, monitoring and enforcement. Emerging concerns regarding the risks to human health and ecosystem integrity from plastic additives must also be factored into global and regional approaches. Where regions are a greater sink for plastic waste than a source of such waste, such as the Island States of the Pacific and the Caribbean, the reliance of these States on globally coordinated and harmonized efforts can no longer be ignored. The transboundary nature of this pollutant alone demands greater harmonization at the global level.

There are principles that are fundamental to the issue of marine plastic litter and microplastics and these should be incorporated in all three policy options presented. These are discussed in section 5.1. Future efforts to combat marine plastic litter and microplastics can also benefit from the review conducted in this assessment of elements included in other MEAs. Examples of these elements are presented in section 5.2. Detailed explanation is provided for option 3 because a new global architecture is likely to attract differences in opinion. However, no single option is given preference in this assessment and benefits would need to be weighed against the challenges for each. The projected increase in global plastic production and current trends towards policy intervention must also be considered.

Table 7: Summary of the legal and policy options

	Option 1: **Maintain Status Quo**	**Option 2:** **Revise and strengthen existing framework, add components to address industry**	**Option 3:** **New global architecture with multilayered governance approach**
Global umbrella mechanism specific to marine plastic litter and microplastics	Not recommended	Yes - Voluntary	Yes – Binding (combination of legally binding and voluntary measures)
Potential implementation methods	• Strengthen the implementation of existing instruments, including the Regional Seas programmes and relevant multilateral environmental agreements. • Monitor developments under the Basel Convention that aim to further address marine plastic litter and microplastics within the scope of the Convention.	• Expand the mandate of an existing international body to include the coordination of existing institutions in the field of marine plastic related action. The coordination shall include: - Building linkages between relevant instruments, e.g. the Basel Convention. - Harmonizing international legal instruments and approaches in Regional Seas programmes. - Promoting the implementation of the sustainable development goals, specifically SDG14. - Encouraging and coordinate industry-led solutions and commitments. • Strengthen and add measures specific to marine plastic litter and microplastics in Regional Seas programmes and other applicable instruments (See Table 3, Sect 2 for summary of options). • Revise e.g. the Honolulu Strategy to encourage improved implementation at the national level and agree on indicators of success. • Adopt a voluntary agreement on marine plastic litter incorporating at least the following measuresmeasures: - Standardize global, regional and national reporting on production, consumption and final treatment of plastics and additives. - Introduce voluntary national reduction targets. - Develop/improve global industry guidelines, (e.g. for the management of polymers and	• Establish a new international legally binding architecture. • In parallel, launch option 2 to take action in the interim and gain experiences that support the development of the legally binding architecture. The legally binding architecture could be implemented in two phases: • Phase I: Develop voluntary measures, including: - Introduction of self-determined national reduction targets. - Development/improvement of industry-led design standards that promote recovery and recycling. • Phase II: Develop a binding agreement, to include: - Ratification/accession procedures to confirm commitment by States. - An obligation to set self-determined national reduction targets. - Develop and maintain national inventories on production, consumption, final treatment and trade of plastics and additives. - Fixed timelines to review & improve national reduction targets. - A duty to cooperate to determine global technical standards to ensure minimum environmental and quality controls by industry. - A duty to cooperate to determine global industry standards for reporting, labeling & certification. - Measures to regulate international trade in non-hazardous plastic waste.

		additives; adoption of global labeling and certification schemes).	- Compliance measures (monitoring & reporting). - Legal basis set for mechanisms for: liability & compensation, funding and information sharing. - Consideration of the needs of developing countries and regional differences (e.g. exemptions and extensions).

5.1. Applicable principles and concepts

The varied impacts on ecosystems as well as socio-economic systems from plastics provide for a number of principles to be applied in order to draw attention and a sense of urgency to the need for fair and equitable action. This action must consider the different types of plastics in use today and in the future.

The overarching principle that would frame a new global architecture to combat marine plastic litter and microplastics is that of sustainable development. The 2002 Johannesburg Declaration on Sustainable Development recognized that millions are denied a decent life due to marine pollution.[235] The principle encompasses, amongst others, the fundamental right to an environment adequate for health and wellbeing, inter-generational equity, conservation, environmental standards and monitoring, prior environmental assessments, integration of conservation into planning and development activities and assistance for developing countries in support of sustainable development.[236]

Sustainable development requires coherent policy that aims for environmental, social and economic outcomes. Effects on biodiversity, human health and food security would be important considerations in achieving sustainable practices, as well as the right to a healthy environment.

Reducing the risks associated with all lifecycle processes of plastics would enable all sectors of the plastics industry, from production to treatment, to achieve a number of Sustainable Development Goals (SDGs). These include:

- **SDG 14.1:** By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.
- **SDG 14.2:** By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.
- **SDG 6.3:** By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.
- **SDG 11.6:** By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.
- **SDG 12.4:** By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment.

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[235] United Nations, *Johannesburg Declaration on Sustainable Development (A/CONF.199/20) Chapter 1, Resolution 1*, (Johannesburg Declaration on Sustainable Development (A/CONF.199/20) Chapter 1, Resolution 1) https://documents-dds-ny.un.org/doc/UNDOC/GEN/N02/636/93/PDF/N0263693.pdf?OpenElement>., para. 13.

[236] United Nations, *Report of the World Commission on Environment and Development: Our Common Future (Brundtland Report) (Annex to document A/42/427)* (Oxford University Press, 1987). Annexe 1.

- **SDG 12.5:** By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse.

The precautionary principle or approach can shift the duty of care in proving an activity is safe to those that are proposing the activity, thereby reducing the reliance on the public sector or opponents to prove harm.[237] This is embodied in the Stockholm Convention that requires the review for a proposed listing of a chemical to proceed despite the availability of full scientific certainty.[238] The use of chemicals in the manufacture of plastics should not be allowed without adequate proof of no harm to the environment and human health.

Research has not yet uncovered all the impacts which plastic waste has on every aspect of human lives and biodiversity, yet it is arguable that sufficient knowledge is available to progress from precaution to prevention. The principle of prevention would mean in the first place to emphasize measures that aim at preventing marine litter at the source. It would also apply to the elimination of unnecessary and high-risk plastic products, polymers and additives and to prevent their entry to market. New chemicals and composites are entering lifecycle of plastics on a very regular basis. The principle of prevention would imply all components of plastic products should be assessed for their risk potential to cause harm during production, use, transport, final treatment (including incineration) and in the event such products should enter the environment. The principle also implies that the use of non-renewable resources, as well as any avoidable contributions to climate change, should be eliminated throughout the full lifecycle of products. Mitigation strategies would prevent plastic waste entering the marine environment. This includes riverine litter capture systems as well as effective solid waste management and wastewater treatment services. Setting environmental standards would also prevent unregulated emissions into air and water from sources ranging from microplastics to chemicals emitted from incineration plants. These are some applications of the principle of prevention that would assist States in their duty of due diligence to prevent transboundary harm by marine plastic litter and microplastics.

Sustainable development encompasses the principle of extended producer responsibility. The latter principle has led to industry take-back schemes, but should be extended to include the design phase aimed at circular material flows for plastic polymers and additives. Products would not be allowed to market if they do not meet agreed standards of recyclability for all components and/or contribute substantially to other environmental targets such as climate change.

The polluter pays principle applies not only to the costs of remediation, such as accidental spills of cargo containing pellets, but also to prevention and mitigation. Industrial plants should bear the cost of monitoring and reporting within license and permit restrictions, particularly at known industrial and commercial point sources. This includes the costs of implementing programs such as Operation Clean Sweep and Zero Pellet Loss.[239] The cost of environmental impact assessments for proposed products, polymers and additives, as well as developing and implementing industry guidelines and commitments, should also be borne by the producer. Where the polluter is the consumer, fines should reflect the cost of cleanups by local entities for items not disposed of responsibly.

The prolific occurrence and longevity of plastic pollution in the environment will result in an unfair burden being placed on future generations. The principle of intergenerational equity would apply to the loss of biodiversity and food security that future generation will experience as well as the costs of e.g. cleanup of plastic waste discharged to the environment decades before. The transboundary nature of macro and microplastics can place a similar unfair burden on communities that did not generate the pollution but receive it due to the activities of other communities. This is particularly true for those living in areas that are natural sinks for plastic waste. The principle of intra-generational equity therefore applies today to prevention, mitigation and cleanup activities.

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[237] Cooney, R., *The Precautionary Principle in Biodiversity Conservation and Natural Resource Management. An issues paper for policy-makers, researchers and practitioners* (IUCN, Gland, Switzerland and Cambridge, UK., 2004)..

[238] 2001 Stockholm Convention., articles 8(7.a), 8(9).

[239] American Chemistry Council, above n 210.

The user pays principle would aim to reduce per capita consumption. For example, households that must purchase stickers for each bag of waste placed on the curbside for council pickup tend to reduce their waste generation. Placing a cost on plastic bags has been shown to reduce consumption and therefore pollution by these items considerably. Taxes on unnecessary and hazardous items can also assist in recovering the costs of collection and treatment.

Ecosystems are complex and may respond to management interventions in unexpected ways, the respect of good governance principles during policy development and implementation is essential for effective policy implementation. Good governance is participatory, accountable, transparent, responsive, consensus oriented, effective and efficient, equitable and inclusive, and follows the rule of law.[240]

The use of best environmental practices and best available techniques can be given effect through the implementation of prevention strategies, such as elimination of pellet loss, compliance with air and water emission targets and research and development aimed at improved practices and techniques.[241] Coupled with the latter would be the principle of stakeholder engagement that is inclusive of industries working towards closing the material loop and alternate practices of production and consumption.

All of the above principles, approaches and practices would support the principle of integrated coastal and river management and ridge to reef management approaches. For land-based sources of marine plastic litter, the boundary between land and ocean is potentially the final intervention point for the prevention of plastic waste entering the marine environment. Equally important are rivers, a primary pathway for plastic waste to reach coastal environments.

The principle of freedom of information and the right to know would be embodied in labeling and certification schemes. Labeling can be designed to inform the public about a product, whereas certification schemes for cities could indicate adherence to consumption reduction targets and waste management standards. Access to public records on impacts resulting from emissions from industrial facilities involved in the manufacture, recycling, final treatment, etc. of plastics and plastic waste must also be made accessible to the public by authorities as per the Aarhus Convention.[242]

Protection of the marine environment is a moral obligation and key to the concept of the common concerns of humankind. These concerns "transcend the boundaries of a single state and require collective action in response."[243] The ability of plastics to travel and impact societies and ecosystems remote from the source, with the efforts of one community being undermined by the lack of effort by other communities, makes marine plastic litter and microplastics a common concern of humankind requiring global action.

5.2. Finding examples in existing instruments

UNCLOS provides for a global mechanism to develop national laws and regulations which, depending on the source of pollution, must either take into account internationally agreed rules, standards and recommended practices and procedures (e.g. laws and regulations relating to land-based pollution, article 207), be no less effective than the global rules and standards (e.g. laws and regulations relating to dumping, article 210) or have the same effect as that of generally accepted international rules and standards (e.g. laws and regulations relating to pollution from vessels, article 211). The issues associated with marine plastic litter and microplastics are diffuse and can be likened to the issues of climate change.

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[240] UNESCAP, *What is Good Governance?* (United Nations Economic and Social Commission for Asia and the Pacific, 2016).

[241] Underwood, A. J. et al, 'Some problems and practicalities in design and interpretation of samples of microplastic waste' (2017) (9) *Analytical Methods* 1332-1345.

[242] *UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters*, opened for signature 25 June 1998, 2161 UNTS 447 (entered into force 30 October 2001) ('*Aarhus Convention*') <https://www.unece.org/env/pp/treatytext.html>.

[243] Shelton, D., 'Common Concern of Humanity' (2009) 39(2) *Environmental Policy & Law* 83-96.

The Paris Agreement,[244] along with other MEAs that aim to take measures to remedy or otherwise manage global issues, can provide examples for a new international architecture. Measures previously agreed in other instruments can reduce the time needed to negotiate and adopt a new architecture by providing solid starting points for Parties.

Table 8 provides examples of elements included in other agreements that may be applicable to marine plastic litter and microplastics. This table does not provide an exhaustive list of principles and instruments but serves only to illustrate precedent in existing MEAs that aim to protect the environment and human health and may serve to stimulate further research into existing agreements during the design phase of a new architecture or when considering current efforts under existing instruments.

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[244] As of April 4, 2017, there were 197 signatories to the Paris Agreement, of which 141 Parties have ratified the agreement (http://unfccc.int/paris_agreement/items/9444.php)

Table 8: Examples from international MEAs

Applicable element	MEA	Relevance to marine plastic litter & microplastics	Applies to all marine litter or requires modification
Principles & concepts			
Equity	Paris Agreement, art. 2.2 UNCLOS, Preamble	Longevity of plastic waste affects Intergenerational Equity. Transboundary nature of plastics affects communities not responsible at source – Intragenerational Equity	Applicable to all types of marine litter.
Environmental justice, intergenerational equity	Aarhus Convention, art. 1	Everyone has the right to live in an environment adequate to his or her health and wellbeing. Longevity of plastic waste affects Intergenerational Equity.	Applicable to all types of marine litter.
Sustainable development. Sustainable lifestyles, sustainable patterns of consumption and production, with developed country Parties taking the lead.	WTO Marrakesh Agreement, Preamble Paris Agreement, art. 4.1 Paris Agreement, Preamble	Requirement to design plastic products that are recyclable, contain recycled content, protect human health, marine ecosystems & food webs. User and producer responsibility to achieve 6Rs.	Applicable to all types of marine litter.
Differential treatment, e.g. flexibility of commitments, action and use of policy instruments.	Montreal Protocol, art. 5; General Agreement on Tariffs and Trade (GATT), Arts. XXXVI.8, XVIII.7(a), XVIII.8, XVIII.13)	SIDS, developing countries, LDCs and countries with economies in transition may be in need of assistance to meet targets & may require exemptions and exceptions.	Applicable to all types of marine litter.
Common concern of humankind.	CBD, Preamble Paris Agreement, Preamble	The oceans sustain life on land and provide fundamental services to humans. Plastics and microplastics threaten this global public good and are thus of a concern for all.	Applicable to all types of marine litter.
Conservation of all ecosystems integrity, including oceans, and protection of biodiversity.	Paris Agreement, Preamble CBD, art. 7.d, 7.f UNFSA, Preamble	Ecosystems & biodiversity negatively impacted by macro and microplastics through ingestion, entanglement, leaching of additives, etc.	Most impacts from marine plastic litter are applicable to all types of marine litter. Impacts from microplastics may vary from marine litter.
Waste hierarchy	Basel Convention, Technical Guidelines for Plastic disposal; EU Waste Framework Directive (2008/98/EC)	Least polluting processes are prioritized over recycling and recovery (e.g. incineration) and long-term disposal (e.g. landfill). All will assist in preventing marine plastic litter, but not all will prevent microplastics.	Applicable to all types of marine litter.

EIA - States shall … endeavour, as far as practicable … to observe, measure, evaluate and analyse … the risks or effects of pollution of the marine environment. In particular, States shall keep under surveillance the effects of any activities which they permit or in which they engage in order to determine whether these activities are likely to pollute the marine environment. When States have reasonable grounds for believing that planned activities under their jurisdiction or control may cause substantial pollution of or significant and harmful changes to the marine environment, they shall, as far as practicable, assess the potential effects of such activities on the marine environment.	UNCLOS art. 204, 205, 206	Should be extended to agreed marine plastic litter items and additives.	Can be extended to agreed marine litter items and substances of concern.
Protection of human health			
"The objective of this Convention is to protect human health and the environment from persistent organic pollutants."	Stockholm Convention, art. 1. See also articles 3.2(b.iii.a); 3.6; 6.1; 8.7(a); 9 .5; 11.1(b, d); 13.4	Additives used during the production of plastic products should be tested to prove no harm to humans prior to being released to market.	Applicable to all types of marine litter.
"Environmentally sound management of hazardous wastes or other wastes" means taking all practicable steps to ensure … are managed in a manner which will protect human health and the environment against the adverse effects which may result from such wastes," -	Basel Convention, art. 2.8	Effective management of plastic waste will reduce risks to human health from contamination of marine food sources. Management of coastal landfill and dumpsites for protection of marine environments will also reduce health hazards to humans.	Applicable to all types of marine litter.
Transparency & freedom of information			
The right of access by the public to environmental information from public authorities.	Aarhus Convention, art. 4; Protocol on Pollutant Release and Transfer Registers to the Aarhus Convention.	Transparency through access to public records maintained by authorities on environmental factors affecting the environment and public health, including emissions from industrial facilities dealing with the manufacture or final treatment of plastics.	Applicable to all types of marine litter.

Parties shall cooperate in taking measures, as appropriate, to enhance … public access to information.	Paris Agreement, art. 12	Transparency through labeling and certification schemes for plastic products; public access to national inventories.	Can extend labeling and certification schemes and national inventories to agreed marine litter items of concern.
The transparency framework shall … be implemented in a facilitative, non-intrusive, non-punitive manner, respectful of national sovereignty.	Paris Agreement, art. 13.3	Option 3 suggests self-determined national targets are set and made publically available in national inventories. This can be facilitative, non-intrusive and non-punitive.	Can be extended to agreed marine litter items and substances of concern.
"For the purposes of this Convention, information on health and safety of humans and the environment shall not be regarded as confidential."	Stockholm Convention, art. 9.5	Global labeling & certification scheme for plastics detailing product components and impacts of lifecycle processes.	Can be extended to agreed marine litter items and substances of concern.
Implementation: Binding measures			
Obligation to prepare successive nationally determined contributions (targets)	Paris Agreement, art. 4.2	Option 3 suggests self-determined national targets.	Can be extended to agreed marine litter items and substances of concern.
States to review national targets with progressively ambitious reductions.	Paris Agreement, art. 4.3	Option 3 suggests a process for regular review and improvement of self-determined national targets	Can be extended to agreed marine litter items and substances of concern.
Mandatory timelines for reviewing and communicating new reduction targets.	Paris Agreement, art. 4.9	Option 3 suggests fixed timelines for review of self-determined national targets	Can be extended to agreed marine litter items and substances of concern.
"Develop, periodically update, publish and make available to the Conference of the Parties …. national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol."	UNFCCC, art. 4.1(a)	Option 3 suggests mandatory national inventories to enable tracking (consumption, production, import, export), transparency, setting reduction targets, etc.	Can be extended to agreed marine litter items and substances of concern.
Mandatory submission of national reports on implementation measures taken and their effectiveness in meeting the objectives of the Convention	CBD, article 26 Stockholm Convention, art. 15	Option 3 suggests mandatory national reporting	Can be extended to agreed marine litter items and substances of concern.
Agreed baseline reference.	Paris Agreement, art. 2.1(a); Montreal Protocol, art. 7	Option 3 suggests States must determine baseline levels of production & consumption of plastics and additives of concern. The reference point for this could be an agreed year where sufficient information is available to determine a baseline.	Can be extended to agreed marine litter items and substances of concern.

Annual consumption levels capped.	Montreal Protocol, art. 2.5-2.8	Option 2 suggests voluntary targets are set by industry and State	Can be extended to agreed marine litter items and substances of concern.
Implementation: State voluntary measures			
Reduction targets set by individual States and relative to a common baseline.	Paris Agreement, art. 4.2	Option 3 suggests self-determined reduction targets set by individual States.	Can be extended to agreed marine litter items and substances of concern.
Implementation: Industry engagement			
"Enhance public and private sector participation in the implementation of nationally determined contributions."	Paris Agreement, art. 6.8(b)	The Global Partnership on Marine Litter (GPML) can play a greater role in engaging all stakeholders in the lifecycle of plastics, encouraging solutions by all sectors.	Can be extended to agreed marine litter items and substances of concern.
"A framework for non-market approaches to sustainable development is hereby defined to promote the non-market approaches"	Paris Agreement. art. 6.9	Public education and awareness programs to reduce consumption and pressure industry and government.	Can be extended to agreed marine litter items and substances of concern.
Basel Convention Partnerships Programme. Public-private partnerships with full stakeholder engagement, focusing on particular waste streams (voluntary).	Basel Convention	The Global Partnership on Marine Litter (GPML) can play a greater role in engaging all stakeholders in the lifecycle of plastics, encouraging solutions by all sectors.	Can be extended to agreed marine litter items and substances of concern.
Implementation: Trade control			
Each party shall ban the import and export of the controlled substances from any State not party to the Protocol.	Montreal Protocol, art. 4 Stockholm Convention, art. 3.2(b) Basel Convention, art. 4.5	Option 3 suggests the global regulation of plastic waste not classified as hazardous waste under the Basel Convention.	Can be extended to agreed marine litter items and substances of concern.
Compliance			
"Each Party shall provide to the Secretariat statistical data on its annual production … of each of the controlled substances … for each substance, – Amounts used for feedstocks, – Amounts destroyed by technologies approved"	Montreal Protocol, art. 7	Option 3 suggests mandatory national inventories in which States must track production, consumption of plastics and additives of concern.	Can be extended to agreed marine litter items and substances of concern.
"Each Party shall provide to the Secretariat statistical data on its annual production … of each of the controlled substances … for each substance,	Montreal Protocol, art. 7	Option 3 suggests mandatory national inventories in which States must track import, export of plastics and additives of concern.	Can be extended to agreed marine litter items and substances of concern.

– Imports from and exports to Parties and non-Parties respectively.			
Each Party shall regularly provide a national inventory report of sources and removals, information necessary to track progress. Developed country Parties shall report on financial, technology transfer and capacity-building support provided to developing country Parties.	Paris Agreement, art. 13.7-13.9 (See also art.7.10-7.12)	Parties could report on national inventories, including prevention, mitigation and removal efforts of marine plastic litter and microplastics, progress towards reduced national consumption (particularly of plastics and substances of concern).	Parties could report on national inventories, including prevention, mitigation and removal efforts, progress towards reduced national consumption of marine litter items and substances of concern.
A mechanism to facilitate implementation of and promote compliance with the provisions of this Agreement ... shall consist of a committee that shall be expert-based and facilitative in nature and function in a manner that is transparent, non-adversarial and non-punitive.	Paris Agreement, art. 15	A similar approach could be applied to a new agreement for marine plastic litter and microplastics.	A similar approach could be applied to a new agreement for marine litter in general.

The EU Directives that could provide further lessons at a more detailed and regional level include:

- Plastic
    - Directive relating to plastic materials and articles intended to come into contact with foodstuffs (2002/72/EC)
    - Directive on Good Manufacturing Practice for materials and articles intended to come into contact with food (2023/2006/EC)
    - Directive on packaging and packaging waste (94/62/EC)
    - Directive on Plastic materials and articles (10/2011/EC)
    - 'Closing the loop - An EU action plan for the Circular Economy'
    - Directive regarding regulation and consumption of light-weight plastic bags (2015/720 amending 94/62/ED)
- Waste
    - Waste Framework Directive (2008/98/EC)
    - Directive on the Landfill of Waste (1999/31/EC)
    - Urban Waste Water Treatment Directive (91/271/EC)
    - Regulation on shipments of waste (No 1013/2006)
    - Directive on port reception facilities for ship-generated waste and cargo residues (2000/59/EC)
- Marine Waters and Water Protection
    - Marine Strategy Framework Directive (2008/56/EC)
    - The Water Framework Directive (2000/60/EC)
    - Directive 2006/7/EC concerning the management of bathing water quality and repealing Directive 76/160/EEC
- Due Diligence by Industry
    - Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) (EC, 1907/2006)
    - EIA Directive (2014/52/EU)
    - Directive for the setting of ecodesign requirements for energy-related products (2009/125/EC)
    - Raw Materials Initiative (SEC/2008/2741)
    - Industrial Emissions Directive (ICE)

In addition to these directives, the EU action plan for the Circular Economy[245] aims to address plastics as one of five priority areas. The Strategy on Plastics in a Circular Economy targets, amongst others, prevention, eco-design, work on the interface between waste, chemicals and product policies, improve end-markets for secondary raw materials and employ other economic instruments. More ambitious recycling targets for the Packaging and Packaging Waste Directive will be investigated as part of this strategy.[246]

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[245] *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Closing the loop - An EU action plan for the Circular Economy (COM/2015/0614)*, <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614>.

[246] European Commission, *Strategy on Plastics in a Circular Economy* (2017).

5.3. Option 1: Maintaining the Status Quo

The first option for combatting marine plastic litter and microplastics is to maintain the status quo. This option would recognize the actions and progress made under existing frameworks and strategies. As Section 2 of the Assessment has detailed, measures from different binding and voluntary instruments are applicable to the prevention, mitigation and removal of marine plastic litter and microplastics. This issue is being addressed within some of the action plans of the Regional Seas, but also through decisions made under international instruments.

At the global level, the General Assembly, in its annual resolution on oceans and the law of the sea, has encouraged States, in accordance with the commitment expressed in "The future we want" and based on collected scientific data, to take action by 2025 to achieve significant reductions in marine litter to prevent harm to the coastal and marine environment.[247] It has also recognized the need for better understanding of the sources, amounts, pathways, distribution, trends, nature and impacts of marine litter, especially plastics and microplastics, and to examine possible measures and best available techniques and environmental practices to prevent its accumulation and minimize its levels in the marine environment.[248]

The Assembly has encouraged States to further develop partnerships with industry and civil society to raise awareness of the extent of the impact of marine litter on the biological diversity, health and productivity of the marine environment and consequent economic loss, and encouraged States to cooperate, as appropriate, to address marine litter and microplastics in the marine environment. [249] It has also urged States to integrate the issue of marine litter into national and, as appropriate, regional strategies dealing with waste management, especially in the coastal zone, ports and maritime industries, including recycling, reuse, reduction and disposal, to consider developing an integrated waste management infrastructure and to encourage the development of appropriate economic incentives with the aim of reducing marine litter to address this issue, including the development of cost recovery systems that provide an incentive to use port reception facilities and discourage ships from discharging marine litter at sea, and support for measures to prevent, reduce and control pollution from any source, including land-based sources, such as community-based coastal and waterway clean-up and monitoring activities, and encouraged States to cooperate regionally and subregionally to identify potential sources and coastal and oceanic locations where marine litter aggregates and to develop and implement joint prevention and recovery programmes for marine litter as well as to raise awareness of the issue of marine litter and the need to consider environmentally sound options for its removal.[250]

The United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea, established by the General Assembly in order to facilitate the annual review by the Assembly of developments in ocean affairs and the law of the sea, focused its discussions on the topic of "marine debris, plastics and micro-plastics" at its meeting in 2016.[251] It had previously considered the topic of marine debris at its meeting in 2005.[252]

In addition, current efforts include those already discussed under the Basel Convention and the Stockholm Convention. Meetings are ongoing to strengthen national institutions for implementation of the Basel, Stockholm and Rotterdam Conventions as well as Strategic Approach to International Chemicals Management (SAICM).[253] The Global Action Plan adopted by SAICM is voluntary, but may lead to the adoption of binding measures. An example of a shift from voluntary to binding measures can be found in the Mediterranean region that progressed from the voluntary 2012 Strategic Framework for Marine Litter Management[254] to the legally binding 2013 Regional Plan on Marine Litter Management in the Mediterranean, containing concrete measures and timetables.

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[247] See e.g. United Nations General Assembly (UNGA), *Oceans and the law of the sea*. A/RES/71/257, 71, (UNGA Resolution 71/257) http://undocs.org/A/RES/71/257>., para. 183.

[248] See e.g. Ibid, para. 205.

[249] See e.g. Ibid, para. 209.

[250] See e.g. Ibid, para. 210.

[251] See United Nations General Assembly (UNGA), *Report on the work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its seventeenth meeting*, A/71/204, 71, (UNGA Resolution A/71/204) http://undocs.org/A/71/204>.

[252] See United Nations General Assembly (UNGA), *Report on the work of the United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea at its sixth meeting*, A/60/99, 60, (UNGA Resolution A/60/99) http://undocs.org/A/60/99>.

[253] Global Environment Facility Council, *Relations with the Conventions and Other International Institutions*, GEF/C.52/03, 52, (GEF/C.52/03) https://www.thegef.org/sites/default/files/council-meeting-documents/EN_GEF.C.52.03_Relations_with_the_Conventions_0.pdf>.

There are plans to incorporate the issue of microplastics into the negotiation of the post-2020 chemicals agenda of SAICM and the post-2020 biodiversity agenda of the CBD. These linkages align with Agenda 2030 for Sustainable Development and will contribute to achieving the Sustainable Development Goals and beyond.

The IMO has initiated activities to improve the provision and use of adequate port reception facilities in order to support compliance with MARPOL and the policy of "zero tolerance of illegal discharges from ships." A multipronged Action Plan was approved in 2005 and in 2014 the Consolidated Guidance for Port Reception Facility Providers and Users was adopted.[255] As part of the Action Plan, MARPOL Annex V was amended and guidelines developed in 2012 to allow for regional arrangements that enable SIDS to meet the requirements of adequate port reception facilities.[256] More recently, the form of the Garbage Record book has ben updated and amendments made for cargo residues and e-Waste.

The IMO has recognized the potential pathway for micro- and macroplastics, including fishing gear, to enter the marine environment through two waste streams permitted for dumping by the London Protocol under certain conditions. Actions are underway to assess and determine measures to close this policy gap.

The G20 Action Plan on Marine Litter targets, amongst others, source-reducing measures, such as Sustainable Material Management (SMM), through consideration of product innovation, product design and consumer behaviour (product use).[257]

UN Environment's International Environmental Technology Centre (IETC) together with the International Solid Waste Association (ISWA) developed the Global Waste Management Outlook, a first in a planned series of Outlooks. More detailed Regional Waste Management Outlooks are planned for Asia, Central Asia, Africa, Latin America and the Caribbean (LAC), Mountain Regions and Small Island Developing States (SIDS). These will provide recommendations tailored to each region. A waste management outlook for mountain regions has already been completed under this initiative.[258]

The Global Partnership on Waste Management (GPWM) has marine litter as one of nine focal areas. The Partnership aims to enhance international cooperation among international organizations, governments, businesses, academia, local authorities and NGOs in order to "identify and fill information gaps, share information and strengthen awareness, political will, and capacity to promote resource conservation and resource efficiency."[259]

Under the GPA, the Global Partnership on Marine Litter brings together international agencies, Governments, NGOs, academia, the private sector, civil society and individuals. The Partnership has six specific objectives that include globally reducing the impacts of marine litter on economies, ecosystems and human health, as well as enhancing international implementation of the Honolulu Strategy.[260]

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[254] UNEP/MAP, above n 179.

[255] International Maritime Organization (IMO), *Consolidated Guidance for Port Reception Facility Providers and Users (MEPC.1/Circ.834)* (2014).

[256] International Maritime Organization (IMO), *Guidelines For The Development Of A Regional Reception Facilities Plan (Resolution MEPC.221(63))* (2012).

[257] G20, *G20 Action Plan on Marine Litter (Annex to G20 Leaders Declaration)* (2017). Para 2(d).

[258] UN Environment, *Global Waste Management Outlook (GWMO)*, <https://www.unep.org/ietc/what-we-do/global-waste-management-outlook-gwmo>, accessed 19 June 2017.

[259] UN Environment, *The Global Partnership on Waste Management (GPWM)*, <https://www.unep.org/ietc/what-we-do/global-partnership-waste-management-gpwm>, accessed 12 June 2017.

[260] UN Environment, *Global Partnership on Marine Litter (GPML)*, <https://www.unep.org/gpa/what-we-do/global-partnership-marine-litter>, accessed 12 June 2017.

The General Assembly, in its annual resolution on sustainable fisheries, also called for various actions by States, intergovernmental organizations and civil society, including the reduction or elimination of catch caused by lost or abandoned gear; data collection; close cooperation and coordination; raising awareness within the fishing sector and Regional Fisheries Bodies of the issue of derelict fishing gear and related marine litter; and identifying options for action.[261] It has reaffirmed the importance of, and urged accelerated progress by States and Regional Fisheries Bodies in, the implementation of those actions.[262]

Option 1 "Maintaining the status quo" would continue the momentum under the Regional Seas Conventions and Action Plans. Efforts in progress by various other institutions would be encouraged, despite the issue not being a primary objective of any of these instruments. Regional Marine Litter Nodes are being developed to support existing Regional Action Plans on Marine Litter. Research is ongoing to gather data where lacking at the national and regional levels on the sources and extent of plastics and microplastics in the marine environment and in organisms, as well as the associated health and ecological risks this presents. Monitoring and assessment strategies are important in this regard. An example is the HELCOM Expert Network on Marine Litter, which aims to coordinate monitoring and assessment efforts with other Regional Seas Conventions, namely OSPAR and Barcelona Convention, as well as investigate opportunities for cooperation between HELCOM Contracting Parties and River Basin Commissions.[263] Monitoring and assessment standards have been developed for the Mediterranean region, although official statistics are still lacking for most Mediterranean countries.[264]

Member States of some Regional Seas are also co-operating in Solid Waste Management Projects though GEF and other donors, e.g. SPREP, to better manage solid waste on land and prevent pollution of the marine environment. Countries especially developing countries could benefit from model legislation, best practices, etc. that could be customized based on regional/national specificities.

In summary, Option 1 would aim to continue and encourage existing efforts under current instruments by Member States, secretariats, institutions and other stakeholders for both land- and sea-based sources. Efforts to keep marine plastic litter and microplastics as an ongoing agenda item at all meetings could maintain the focus on the issue within individual institutions. Work to make the methods used to monitor environmental emissions and impacts more robust would progress,[265] using existing avenues to communicate results to policy makers and the public. The development of more country waste profiles would potentially lead to greater financial investment and better-targeted waste management systems in high-leakage countries. Awareness programs will continue to seek results through behavioral changes. Efforts to establish a circular economy for plastics may lead to results that are replicable on both a large and small scale.

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[261] See e.g. United Nations General Assembly (UNGA), *Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments,* A/RES/71/123, 71, (UNGA Resolution 71/123) http://undocs.org/A/RES/71/123>., para. 121 and United Nations General Assembly, *Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments,* A/RES/60/31, (UNGA Resolution 60/31) (29 November 2005) <http://www.un.org/depts/los/general_assembly/general_assembly_resolutions.htm>., paras. 77-81.

[262] See e.g. UNGA Resolution 71/123., para. 197.

[263] For more information, see http://helcom.fi/action-areas/monitoring-and-assessment

[264] UNEP/MAP, above n 129, p. 60.

[265] Browne, M. A. et al, 'Linking effects of anthropogenic debris to ecological impacts' (2015) 282(1807) *Proceedings of the Royal Society B* 20142929.; Underwood, A. J. et al, above n 241.

5.4. Option 2: Review and revise existing frameworks to address marine plastic litter and microplastics and add a component to coordinate industry

The second option for combatting marine plastic litter and microplastics is to consider the options recommended in Section 2 of the Assessment and encourage further progress specific to the issue. This could include adopting new instruments specific to marine plastic litter and microplastics under existing conventions and amending existing frameworks and approaches with measures specific to the prevention, mitigation and removal of marine plastic and microplastics. Where instruments may apply, but are not yet implemented in the context of the issue, engagement with the relevant institutions could also assist in strengthening the existing framework. Efforts would be more closely aligned with the Sustainable Development Goals, particularly SDG 14. Refer to Table 3 in Section 2 for measures within current instruments that are specific to marine plastic litter and microplastics.

The mandate of current conventions can be strengthened to enable improved management of marine litter and microplastics. This applies to the Basel, Stockholm and Rotterdam Conventions as well as the voluntary SAICM, all of which provide opportunity to improve the management of plastic polymers and additives at the global level. Option 2 does not imply an extension in reach of the mandate of the Regional Seas Secretariats. The binding Marine Litter Action Plan of the Mediterranean can serve as an example for strengthening the legal and policy frameworks of other Regional Seas for the management of marine litter and microplastics.

Option 2 adds a voluntary global umbrella mechanism for land-based and sea-based sources of marine plastic litter and microplastics to close the gap of this pollutant not being managed by any global institution. An international body would be strengthened to, inter alia, enhance coordination of actions conducted under different instruments and to improve engagement with industry for the development of self-regulatory measures. In most regions, industry collaboration will be broader than engaging those sectors directly involved in the life cycle of plastic, particularly in countries that are net importers of plastics. Examples of sectors to include are trade, tourism and shipping. An example of an international body to coordinate and drive the required collaboration across sectors could be a strengthened GPA with support from the Global Partnership on Marine Litter for implementation.

An important goal would be to improve the effectiveness of the Regional Seas in managing marine plastic litter and micro-plastics as well as enhancing the capacity of the Secretariats to collaborate with industry. The global umbrella mechanism would enable the Regional Seas to strengthen coordination with all relevant stakeholders and encourage voluntary commitments from industry. The UN Environment may be a strong candidate for the role of secretariat for this umbrella mechanism.

Elements that may be progressed under option 2 include standardizing definitions, for example a definition for micro-plastics and a standard for biodegradation in the marine environment. Global, regional and national reporting standards and monitoring protocols would be established, assisting in monitoring and assessment of quantities and impacts of marine plastic litter and micro-plastics as well as the development of compliance measures.

Voluntary targets would be established to guide regional and national actions. These would include guidelines, recommendations and agreements for producers that, for example, detail acceptable use and design of polymers, additives and products. Standards could also be established for sustainable waste management, including recycling targets, Waste to Energy-strategies and environmental controls, landfill reduction targets and wastewater and combined sewer overflow treatment. The 2002 *Technical guidelines for the identification and environmentally sound management of plastic wastes and for their disposal*[266] developed under the Basel Convention could provide a starting point. Additional instruments developed under the Basel Convention are applicable to the prevention of marine plastic litter and micro-plastics, but could be strengthened to promote best management practices for the design, production and transport of plastics to reduce the generation of plastic waste.

Another element to progress under option 2 is a suite of voluntary labeling and certification schemes for plastic products, building on any successes of existing programmes. Such schemes could aim to disclose product characteristics and components with the intention of driving sustainable innovation. The design and outcomes of these schemes would be dependent on the policy instruments targeted

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[266] UNEP/CHW.6/21.

At the international level, there is a need for improved enforcement and compliance with MARPOL Annex V with regards the discharge directly into the marine environment of operational waste containing plastic. The Convention on Biological Diversity could also be amended to include measures specific to microplastics in order to reflect the impact of these particles on biodiversity, both terrestrially and in the marine environment. Efforts under option 2 will build on existing synergies for all chemical and waste agreements, such as the Stockholm, Basel and Rotterdam Conventions as well as SAICM (to 2020) by assessing the resources under these instruments that may be modified to improve their relevance for enhanced management of marine plastic litter and microplastics, as well as recycling and incineration processes.

Current efforts under the Basel Convention include a mandate given to the Open-ended Working Group to consider relevant options available under the Convention to further address marine plastic litter and micro-plastics.[267] A "Household waste partnership" was initiated in 2015 and established in 2017. The workplan for the biennium 2018-2019 aims to:

1) Develop an overall guidance document on the environmentally sound management of household waste, compiling the key outcomes and recommendations resulting from the work of the project groups on:
    a) Best practices related to the environmentally sound management of household waste;
    b) Mechanical biological treatment, energy recovery, management of sanitary landfills and compartmentalization to deal with various waste streams;
    c) Assessment of current waste management systems, decision-making and ensuring the environmentally sound management of household waste;
2) Collect case studies from various regions related to the topics addressed in the guidance document;
3) Enhance awareness-raising and training on the environmentally sound management of household waste and enhance people's participation in household waste management activities and decision-making;
4) Coordinate outreach activities and cooperation with other organizations working on household waste management. [268]

Technical guidelines would be reviewed for the transboundary movements of electrical and electronic waste, many of which contain plastics, as well as guidelines on the incineration of waste on land (D10).[269] The *Framework for the environmentally sound management of hazardous wastes and other wastes* was adopted at COP13 in 2017, which defines a common understanding of what environmentally sound management (ESM) encompasses and provides tools, strategies and recommendations for the implementation of ESM. These would all be applicable to the prevention of marine plastic litter and microplastics. In addition, the technical guidelines for the identification and environmentally sound management of plastic wastes and for their disposal could be reviewed.

In addition, Resolutions 2/9 and 2/11 adopted under the Basel Convention highlight the relevance of this Convention to the issue. In particular:

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[267] See UNEP/CHW.13/11. and Decision BC-13/17 on the work programme of the Open-ended Working Group

[268] Secretariat of the Basel Convention, *Creating innovative solutions through the Basel Convention for the environmentally sound management of household waste*, UNEP/CHW.13/15, 13, (UNEP/CHW.13/15) http://www.basel.int/TheConvention/ConferenceofheParties/Meetings/COP13/tabid/5310/ctl/Download/mid/16172/Default.aspx?id=91&ObjID=15920>.

[269] Secretariat of the Basel Convention, *Work programme and operations of the Open-ended Working Group for the biennium 2018–2019*, UNEP/CHW.13/21, 13, (UNEP/CHW.13/21) http://www.brsmeas.org/2017COPs/MeetingDocuments.aspx>.

- Resolution 2/7 on sound management of chemicals and waste: para. 19. *Emphasizes the importance of the elaboration under and application of existing instruments to further environmentally sound management of waste, including waste prevention, minimization and recovery, to address the underlying causes of marine litter*

- Resolution 2/11 on marine plastic litter and microplastics: para. 7. *Stresses that prevention and environmentally sound management of waste are keys to long-term success in combating marine pollution, including marine plastic debris and microplastics, calls on Member States to establish and implement necessary policies, regulatory frameworks and measures consistent with the waste hierarchy...*

The Honolulu Strategy acknowledges that it is a results-oriented framework for planning, collaboration and monitoring in order to reduce marine litter in general. It was not intended to provide hard targets, stating only "Substantial progress toward the achievement of the goals in the *Honolulu Strategy* however, should be expected to occur by 2030." There is still opportunity to revise the Strategy and agree on strengthened indicators of success. Revisions could also encourage improved implementation at the national level.

New linkages and applications would be explored at the international level. The WHO, WTO and UNIDO could play a greater role in promoting producer and user responsibility. Cleaner production processes within the plastics industry could also be explored by UNIDO. This includes improved application within the lifecycle of plastics of compliance measures relating to emission standards for air, water and biota.

The 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns (10YFP) is a platform to advance implementation of sustainable consumption and production patterns at the national and regional levels. The Framework was adopted in 2012 with UN Environment serving as the Secretariat and provides another avenue for linkages to the prevention of marine plastic litter and microplastics.

Option 2 would seek greater application of economic instruments at the global level to fund the necessary management interventions, finding precedents within the oil industry where trust funds have been established to compensate for pollution incidents.

At the regional level, the binding and voluntary instruments would be strengthened. This includes amending existing LBS/A Protocols to include measures specific to marine plastic litter and microplastics. Approaches, such as Action Plans, could be harmonized where relevant and appropriate. The Mediterranean marine Litter Action Plan could serve as a model for best practice.

Within the context of marine plastic litter and microplastics, coordination and exchange of information would be enhanced and improved standards set at the regional level. Compliance with SDG targets would be promoted through, for example, clear national and regional reporting procedures. Regional Fisheries Bodies also play an important role in preventing the occurrence and impacts of ALDFG. Action by Regional Fisheries Bodies would be encouraged in this regard, as well as integration of their scientific knowledge and broader conservation activities where these are applicable to marine plastic litter and microplastics.

5.5. Option 3: A new global architecture with a multilayered governance approach

5.5.1. Justification for a new global architecture

The negative impacts of marine plastic litter and microplastics are widely recognized as beyond acceptable at both the ecological and the socio-economic levels. The annual global rate of plastic production has continued to grow exponentially with no parallel increment in management measures, resulting in an ongoing contribution to marine plastic litter and microplastics from land and ocean.

There is value in developing a new global architecture for the regulation of marine plastic litter and microplastics. This long-lasting and transboundary pollutant is not addressed under a single legally binding international instrument, but is weakly distributed amongst many. For these, marine plastic litter and microplastics are not a primary objective. Coordination of activities under multiple MEAs and the monitoring of progress specific to the issue of plastic pollution would be challenging. Harmonization of targets and reporting procedures would be two of the challenges presented by a fragmented approach.

A new global architecture not only provides long-term legislative security at the national level, but also provides a level playing field and security for industry if all competitors are subject to the same regulations.

Further justification for a new global architecture is the lack of a global liability and compensation mechanism for pollution by plastic, despite widespread damage resulting from this pollutant. For those instruments that have application in the context of marine plastic litter and microplastics, gaps exist in the geographic coverage, including, as the case may be, internal watersheds. There are also key regions that have not developed binding conventions specific to the issue.

At the global level, the main stakeholders and polluters are not sufficiently engaged in long-term solutions. Some have to bear the costs to the environment and health caused by others, raising the issue of intragenerational justice. This supports the need for a strong capacity-building mechanism at an international level in order to tackle the problem. This is particularly relevant to the issue of marine plastic litter and microplastics due to the transboundary nature of the problem resulting from the unintentional international movement of plastic waste.

5.5.2. Overview of the new global approach

A new global architecture may address the gaps and challenges identified, both at the institutional and the instrument level. A new international legally binding agreement could complement, without undermining or duplicating, existing instruments. Lessons can be learned from existing agreements that aim to manage and fund global issues (see Table 8 for examples). In recognition of the lengthy timeframes required to adopt such an agreement and the urgent need to initiate immediate and effective measures, a dual approach is warranted.

A new global architecture would provide a combination of binding and voluntary measures. These could include voluntary national reduction targets, improved guidelines and annexes for priority chemicals, polymers requiring special attention, products of concern for marine plastic litter and microplastics, legislative guidance, BATs and BEPs.

This dual approach would include:

1. Undertaking urgent and voluntary measures as outlined in option 2 while, in parallel,
2. Developing a global binding architecture.

Progressing current momentum for interim action while developing a global binding framework will allow for initial successes to be gained at both the global and regional level. Interim efforts undertaken as part of Phase I will work towards the intended new framework.

At the institutional level, UN Environment has been identified as a strong candidate for this role, if given the mandate by UNEA. UN Environment has a strong history and body of experience in marine plastic litter and microplastics, has facilitated international negotiation on environmental agreements and already hosts autonomous Secretariats for the Regional Seas Programme, the Secretariat of the Basel, Rotterdam and Stockholm Conventions and the Secretariat for the Convention on Biological Diversity. The Global Partnership on Marine Litter, hosted by UN Environment/GPA could play a stronger role through, for example, the establishment of a scientific advisory body.

5.5.3. Goal, objectives and scope of a new architecture

The overall goal of a new international legally binding instrument would be to reduce the quantities and impact of marine plastic litter and microplastics. This would include impact reduction, prevention and elimination of marine plastic litter and microplastics.

The objectives can be achieved by applying the 6Rs of reduce, redesign, refuse, reuse, recycle, recover, and combined with prevention and removal.

All marine plastic litter and microplastics originating from land as well as ocean sources (e.g. offshore and fishing/mariculture activities) would be included in the scope, as well as all chemicals and additives used within the lifecycle of plastics.

5.5.4. Structure of the agreement

A global architecture for marine plastic litter and microplastics could be guided by the 6Rs. This follows on from the compulsory waste hierarchy of the EU Waste Framework Directive (2008/98/EC) that places prevention as the highest priority, followed by preparing for re-use, recycling, recovery and disposal. (Annex 8.5 outlines suggested solutions by priority and timeline.)

The lifecycle of plastic products could also direct the structure and Annexes. Measures must address 1) processes, such as design, production and consumption; 2) leakage prevention, such as waste management services; and 3) removal from the environment.

The structure of the agreement would include priority actions and, at a minimum:

1. Objectives
2. Principles
3. Definitions
4. Prevention, control and removal measures (e.g. minimum standards and binding targets, trade)
5. Monitoring and Assessment Programmes
6. Calculation methods for agreed targets and measurements (e.g. production, consumption, trade, reduction processes)
7. Compliance, non-compliance and reporting
8. Other mechanisms to be established (e.g. funding, implementation and compliance, compensation, information exchange, stakeholder engagement)
9. Regional and international cooperation
10. Enhancement of public awareness and education
11. Countries in need of differential treatment (e.g. developing countries, SIDS)
12. Review processes (e.g. science, control measures, effectiveness)
13. Meeting of the parties
14. Secretariat
15. Signature
16. Entry into force

Due to the complexities in addressing microplastics, a dedicated section may be required with measures specific to the issue, including global standards, targets and reporting requirements for microplastics.

Annexes are more easily amended and are therefore suited to guidelines and priority products, polymers and additives. Further discussion is provided on some of the elements listed above.

5.5.5. Control measures

Measures of control can be binding or voluntary and a new agreement to combat marine plastic litter and microplastics would require a combination of these. A first step is for States to make a commitment to a new agreement and agree to adopt measures within their domestic policies and legislation.

5.5.5.1. Binding measures

There are two broad approaches for mandatory control measures. Some measures are aimed at incentivizing reductions in domestic rates of production and consumption while others aim to regulate international trade of non-hazardous plastic waste. The establishment of binding measures also incentivizes financial assistance, which may not be as forthcoming for voluntary measures.

5.5.5.1.1. Binding commitment by States

Ratification of a new international legally binding architecture is the first step by States to a commitment to reduce the quantities and impact of marine plastic litter and microplastics. The minimum standards would be set in the new agreement that participating States agree to be bound by in order to meet the global objectives of impact reduction, prevention and elimination of marine plastic litter and microplastics through application of the 6Rs.

5.5.5.1.2. Set self-determined national reduction targets

The obligation must be established for States to identify categories of plastic waste that are of concern, e.g. non-recoverable microplastics, single-use packaging, plastic waste from the agricultural and medical sectors as well as all sea-based sources. Baselines can then be determined for each. This will assist in determining national reduction targets based on the 6Rs as applicable to each category. These targets can include recycling and landfill targets, as well as reductions in production and consumption. The SAICM Global Action Plan can serve as an example for targets to reduce the impact of chemicals specific to marine plastic litter and microplastics.

5.5.5.1.3. Review and improvement of self-determined national reduction targets

The Montreal Protocol includes a mechanism for amending the list of controlled substances, as do the Stockholm and Basel Conventions. These amendments are then binding on those Parties that agree to be bound by them. The Paris Agreement provides more flexibility, allowing Parties to prepare their own nationally determined contributions (NDCs) as well as the mitigation measures aimed at achieving the objectives of these contributions. These NDCs are to be communicated every five years, recorded in a public registry and must improve on the ambition of the previously communicated NDC (article 4). The new agreement for marine litter can learn from these mechanisms established under MEAs.

5.5.5.1.4. Cooperate to determine global standards

Global standards provide consistency in the application of regulations for both government and industry. A clear understanding of the desired outcomes is important when setting standards and targets. Uniformity of environmental regulations and trade controls, for example, prevent a race to the bottom with regard to environmental standards and provide security for private investment. This is particularly important for industries where profit margins are low, such as the recycling industry.

Standards can also be categorized into legal standards (such as the zero tolerance of plastic discharge established by MARPOL Annex V) and technical standards (e.g. ISO standards). Standards may be in the form of voluntary guidelines and can assist in setting both voluntary and binding targets and streamlining reporting procedures. Standards are discussed further in the following sections.

International quality standards for the types of plastics produced for domestic and international markets can reduce the production of off-specification plastics. By setting the minimum standards that authorities should incorporate in domestic operating licenses issued to manufacturing facilities, the entry to market of inferior plastics, as well as the re-entry of regulated chemicals, can be better managed.

As mentioned, a new architecture could set the standards for environmental controls, monitoring methodologies, reporting, as well as minimum quality standards for manufactured plastics and traded plastic waste. Such standards would not determine national reduction targets but would guide States in achieving their targets in compliance with WTO regulations.

5.5.5.1.5. National Inventories

Domestic production and consumption can be addressed through an obligation to maintain national inventories. These would assist States in complying with tracking, monitoring and reporting as per agreed international standards. Such standards could include waste management processes (e.g. landfilling, recycling, incineration), other lifecycle processes (e.g. mandatory adoption of Operation Clean Sweep or Zero Pellet Loss) import and export of non-hazardous plastic wastes and use of post-consumer content in production processes. The consumption of additives and other chemicals used in the production and treatment of plastics would also be important components to track through national inventories,[270] particularly those not addressed under the Stockholm Convention.

National inventories can assist States in determining relevant baseline information that informs national reduction targets. At a regional and international level, reporting from national inventories will provide uniform information to better understand the full lifecycle of plastics at a global level. The Principle of Freedom of Information could be given effect by making these national inventories publicly available. This gives effect to article 205 of the United Nations Convention on the Law of the Sea, which requires States to publish reports on the results of pollution monitoring and impact assessments or provide such reports to the competent international organizations as mandated in articles 204 and 206 respectively. National inventories should also take into account regional collaborative approaches, notably those developed within Regional Seas programmes.

The obligations established under this agreement would therefore include, at a minimum:

1) establishing national inventories,
2) determining baselines,
3) setting, reviewing and improving national targets as per defined timelines, and
4) complying with reporting standards.

5.5.5.1.6. Labeling and certification

A global labeling scheme, certified by a central authority, would incentivize sustainable design in order to meet standards set by the scheme. Harmonizing such a scheme with recycling technologies, availability and profitability while allowing for innovation, would move the lifecycle of plastics closer to a circular materials flow. As discussed in Section 5.5.5.1, labeling and certification schemes provide transparency to the consumer and give effect to the principle of freedom of information. Such schemes can assist with national reporting on consumption and production, as well as tracking of the import and export of products and waste.

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[270] Browne, M. A., above n 188.

Labeling can inform consumers of, for example, the components used in products (polymer types, additives, recycled content, etc.), the practices used in production, transport and treatment[271] of the product and the recyclability of a product or the biodegradability of a product in the marine environment. Information could also be educational such as best practices on how to recycle a particular product, as promoted in strategy A3 of Goal A in the Honolulu Strategy.[272]

National inventories should be made available to the public and to the different industry sectors. The relationship of mandatory labeling and certification schemes with the **WTO Agreement on Technical Barriers to Trade** (TBT Agreement) would also need to be clarified, particularly where they relate to "product characteristics or their related process and production methods."[273]

5.5.5.1.7. International Trade

A new agreement would need to address trade in non-hazardous content of plastic waste, thereby supplementing efforts already underway within the Basel and Stockholm Conventions. Plastic waste that contains hazardous substances and displays the characteristics defined under Annexes I and III of the Basel Convention would not be regulated under the trade controls of the new agreement. Plastic waste materials and additives not adequately addressed by the definitions and controls of the Basel and Stockholm Conventions would therefore be in scope of the new agreement.

The regulation of international trade requires setting global standards for import controls as well as export controls. As well as technical controls, the restriction of trade of non-hazardous plastic waste to and from non-Parties to the agreement would also need to be determined.[274]

For import controls, the receiving State would adopt national regulations that define import standards, require inspection processes to be complied with and accept only those waste bales that meet defined criteria. These national regulations would need to at least meet international standards, if not exceed them.[275] China recently implemented the National Sword Policy, enforcing inspections of imported plastic waste at ports and of recycling facilities to check compliance with environmental controls. A number of types of plastics were listed with the WTO for import prohibitions.

Export controls would include the obligation to adopt national regulations that define the standards waste bales must meet, for example contamination levels and mixing of plastic polymer types and additives. Some additives in older products are no longer permitted in the production of certain plastic categories, particularly those used in food grade products and toys. The re-entry of these chemicals into the recycling stream could be regulated at the international level. Where these guidelines or standards are set internationally, national regulation should be amended to comply with such export standards in order to protect human health.

Export controls should set the minimum environmental controls a receiving State must have in place for their domestic recycling facilities, including the transport of such waste. Waste processors in the exporting State must ensure the receiving facilities are registered in the national inventory of the relevant State. A mechanism should also be agreed on processes to update import and export controls as well as the certification of facilities within national inventories. Certification could also extend to the shipping sector.

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[271] For examples, see the Green Dot trademark http://www.pro-e.org/Overview.html and Operation Clean Sweep.

[272] See www.how2recycle.info

[273] As per Annex 1.1 of the TBT Agreement, a technical regulation is a document "which lays down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory. It may also include or deal exclusively with terminology, symbols, packaging, marking or labeling requirements as they apply to a product, process or production method."

[274] Raubenheimer, K. and McIlgorm, A., 'Is the Montreal Protocol a model that can help solve the global marine plastic debris problem?' (2017) 81 *Marine Policy* 322-329.

[275] For examples of import controls, see China's Green Fence policy (http://www.waste360.com/business/what-operation-green-fence-has-meant-recycling) and the recent National Sword policy (http://www.scmp.com/news/china/policies-politics/article/2103587/china-bans-imports-garbage-overseas)

In addition to regulating the cross-border trade of non-hazardous plastic waste, the trade of technology should be considered for global regulation. Technology, such a small-scale pyrolysis plants exported to developing countries and least developed countries (LDCs) to treat plastic waste, should meet minimum global environmental standards before being accepted into a receiving State, whether the receiving State is party to the agreement or not. Such global standards could assist in protecting human health and biodiversity in receiving States where equivalent environmental standards may not have been adopted within national legislation.

Trade measures could assist in regulating plastic products of concern in specific areas such as SIDS that are net importers of large quantities of consumer products in plastic packaging. Mandatory trade measures developed under a new international legally binding instrument for both products and technology would need to consider the instruments agreed under the WTO. The relationship with these should be clarified in the new agreement to avoid conflict and market distortion.

5.5.5.1.8. Set the legal basis for a liability and compensation scheme

A gap identified in the current legal and policy framework is the lack of a global compensation mechanism for damage to the environment or damage to human health resulting from marine plastic litter and microplastics. A new agreement provides an opportunity to close this gap by setting the legal basis for the establishment of such a mechanism. Refer to Section 5.5.8 for further considerations for a liability and compensation scheme for marine plastic litter and microplastics.

5.5.5.2. Voluntary measures

Non-binding measures can apply to States as well as the various sectors within the lifecycle of plastics. These industry sector measures would need to be adopted at the national level, but should adhere to a global approach for managing the plastics industry.

5.5.5.2.1. Government national reduction targets

At the State level, as for the UNFCCC and the Paris Agreement, States may be obligated to set national reduction targets, but these targets would be self-determined. As suggested under the discussion on binding measures, these would be published in the mandatory national inventories of each State.

Targets must aim to meet the objective of the new agreement, namely to reduce the quantities and impact of marine plastic litter and microplastics. Section 5.1 lists some of the Sustainable Development Goals that should inform the targets set, particularly SDG 14.1, but with a goal of zero emissions of plastic waste into the marine environment. Targets should also include elimination of risk to human health from plastic products or the waste products thereof. This is in line with the goals of Agenda 21, Chapter 6 and the Rio+20 outcome document entitled "The future we want" and the SDGs as defined in the 2030 Agenda for Sustainable Development.

When setting targets, care must be taken in defining an "acceptable level of pollution." This may be difficult to agree and difficult to monitor on a global scale. Article 206 of the United Nations Convention on the Law of the Sea requires States, when they have reasonable grounds for believing that planned activities under their jurisdiction or control may cause "substantial pollution of or significant and harmful changes to the marine environment", to, as far as practicable, assess the potential effects of such activities on the marine environment. The term "significant harm" appears in the UN Watercourses Convention (article 7), placing *significant* above *trivial* or *perceptible*, but below *substantial* or *severe*. Both conventions imply a duty of due diligence by States to prevent harm to human health and/or safety as well as marine ecosystems.[276] Defining an acceptable level of pollution may set a lower threshold than significant harm. It is therefore suggested that a target of a "level without harm" be considered as per the objective of the new agreement. Papers by Browne et al. 2015 Proceedings; Rochman et al. 2016 Ecology; Underwood et al. 2017 suggest a focus on ecological impacts as these are central to maintaining biodiversity and ecosystem services/ functions on which humans rely. These papers show a focus on contamination and sub-lethal impacts to organisms is problematic because they are not linked to ecological impacts.

5.5.5.2.2. Global standards for industry

Stakeholder engagement mechanisms could provide a forum for industry sectors to engage in solutions. This would include developing guidelines and recommendations for the various sectors, from design to cleaner production, transport and treatment methods. Measures developed could be self-regulatory and co-regulatory, possibly leading to global regulation.

There is a need for global standards across the entire lifecycle of plastics from product design, including polymers and additives, to end-of-life treatment. Pre-production pellets should be clearly recognized within this lifecycle analysis with specific standards and targets set for their containment. Sector processes must also be reviewed and minimum standards set to meet global sustainability targets. The Sustainable Development Goals could form a basis for these standards (see section 5.1 on the Principle of Sustainable Development).

Standards for recycling can be applied domestically and to the international trade of plastic waste. Defining standards that provide cleaner bales within plastic waste streams and defining the criteria of "recyclable" products would assist in reducing costs to recycling facilities and reducing the number of contaminated bales being sent to landfill. The design of products must embrace the principle of Extended Producer Responsibility, which would encourage compatibility with recycling technologies[277] as well as the release of microplastics through product wear and tear.

The Association of Plastic Recyclers provides a design guide that categorizes products by their recyclability and defines recyclability as:

- At least 60% of consumers or communities have access to a collection system that accepts the package
- It is most likely sorted correctly into a market-ready bale of a particular plastic meeting industry standard specifications, through commonly used material recovery systems, including single-stream and dual stream MRFs, PRF's, systems that handle deposit system containers, grocery store rigid plastic and film collection systems.
- It can be further processed through a typical recycling process cost effectively into a postconsumer plastic feedstock suitable for use in identifiable new products.[278]

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[276] UN Watercourses Convention, *User's Guide Fact Sheet Series: Number 5. No Significant Harm Rule*, <http://www.unwatercoursesconvention.org/documents/UNWC-Fact-Sheet-5-No-Significant-Harm-Rule.pdf>, accessed 21 June 2017.

[277] See Institute of Scrap Recycling Industries Inc (ISRI), *ISRI Design for Recycling®*, <http://www.isri.org/about-isri/awards/design-for-recycling#.WLn9LxJ96Ho>, accessed 12 June 2017.; The Plastic Redesign Project, *Design for Recyclability. Recommendations for the Design of Plastic Bottles*, <http://www.plasticredesignproject.org/files/DesignforRecycling.html>, accessed 2 June 2017.

[278] The Association of Plastic Recyclers, *Welcome to the APR Design® Guide for Plastics Recyclability*, <http://www.plasticsrecycling.org/apr-design-guide/apr-design-guide-home>, accessed 2 June 2017.

Consideration must also be given to additives of concern that should not re-enter the market through recycling processes due to their risk to human health, particularly in foodware and toy products.

The updated OECD Guidance on Extended Producer Responsibility provides recommendations on incentivizing product design for the environment:[279]

- Ensure the full costs of end-of-life management are covered by producer fees in order to maximize design-for-environment incentives.
- Variable rather than fixed producer fees should be applied in collective schemes where this is feasible.
- Consider the use of innovative approaches such as modulated fees (e.g. according to content of hazardous substances) or the use of new technology that may allow to link fees with end-of-life costs for specific products and improve cost allocation among producers.
- Enhance information flow from downstream sectors and users to manufacturers with a view to enhancing design for environment.
- Producer Responsibility Organisations should support R&D efforts intended to improve the eco-design of their products by sharing their experience and, when cost-effective, by providing financial support.
- International harmonization of the design of globally traded products should be encouraged with a view to improving their eco-design.

The requirement to conduct environmental impact assessments (EIA) could also be standardized to ensure product design and composition minimizes the risk to the marine environment for both macro and microplastics, giving special consideration to single use packaging. Criteria may be set for types of products that may not require an EIA if they are regulated through other mechanisms or because there is a zero tolerance for such products on the market (e.g. microbeads), similar to the zero tolerance for ocean dumping of plastic waste. All methods of waste treatment should be assessed for their impact on the environment before being promoted as sustainable options.

5.5.6. **Compliance**

The UN Environment Guidelines on Compliance with and Enforcement of Multilateral Environmental Agreements can serve as a basis for designing compliance measures within a new international legally binding instrument for marine plastic litter and microplastics. These advisory guidelines list monitoring and reporting as important tools in promoting compliance with an MEA.

5.5.6.1. Monitoring

A new agreement provides an opportunity to define minimum global monitoring indicators, with encouragement for individual States to include additional indicators where appropriate and within their capacity. The results of monitoring activities can be recorded in national inventories.

Minimum indicators could include:

- Monitoring of marine plastic litter and microplastics,
- Unmanaged/mismanaged plastic waste,
- Treatment of waste (e.g. recycling, incineration and landfill rates),
- Monitoring of wastewater and rivers,

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[279] OECD, above n 197.

- Point source pathways (e.g. industrial outlets, marine outfalls),
- Adoption of national legislation (e.g. landfill ban/taxes, pay as you throw programs, design guidelines, emission standards for air, water and biota),
- Areas with large accumulations and high-risk areas (e.g. dumpsites, other inputs from land, ecologically sensitive areas and organisms),
- Other ecological, economic and human impacts.

5.5.6.2. Reporting

Binding measures provide important indicators to report on, but some voluntary measures may also provide reporting opportunities. Reporting can also provide valuable information on the global plastics industry that is not currently available in all regions. An improved understanding of the sectors may also provide opportunity to develop additional voluntary and binding standards and targets in the future. The engagement of civil society is important in combatting marine plastic litter and microplastics and should therefore have insight into national, sub-regional, regional and international reports and access to all information gathered.

Information included in reporting procedures should include:

- consumption from domestic and imported sources;
- production patterns for domestic and export purposes;
- waste management procedures (e.g. volume and type of plastics recycled);
- non-hazardous plastic waste imported and exported;
- additives produced, traded and treated;
- NGO and citizen science involvement.

Reporting should be standardized at the sub-regional, regional and international level. An example of national reporting can be found in article 7 of the Stockholm Convention. Each Party was required to develop a national plan for the implementation of its obligations under the Convention, communicate this plan to the COP within two years of the Convention entering into force and periodically review and update the plan.

Consideration must also be given to those countries in need of assistance with regards capacity building and compliance facilitation. Refer to section 5.5.7 *Consideration for States in need of differential treatment*, as well as sections 5.5.8 for further discussion on information sharing and a financial mechanism. Reporting requirements can be challenging in developing countries and should therefore be streamlined to include critical indicators necessary to monitor and evaluate effectiveness of any measures taken.

5.5.7. Consideration for States in need of differential treatment

The ability of States to comply with agreed measures differs for many reasons. These can include cultural variances, access to finance for implementation and enforcement, geographical challenges, weak markets due to lower supply and demand, and the level of political support at the national level. These variances may lead to differentiated obligations under the agreement.

There are 44 landlocked States that are contributors to marine plastic litter and microplastics through different pathways but would be impacted by the effects of these pollutants in the marine environment to a lesser degree. Engagement of these states in a new agreement may require additional considerations. Irrespective of geographical and economic differences, all States must have equal and fair representation in any established technical bodies and standing dispute settlement bodies.

Small Island Developing States do not produce the volumes of waste required to sustain a recycling industry or incineration plants. Options may be available through regional collaboration but will be subject to the costs of shipping between islands and from remote areas. Allowances may need to be made on import and export controls of non-hazardous plastic waste and acceptable treatment processes. These States may also receive more waste from transboundary sources than they produce domestically and may therefore be eligible for funding to assist with cleanup efforts. Geographic features may also mean relocation of landfills from coastal zones may not be possible.

Exemptions for States in need of additional assistance or experiencing other challenges may include:

- Exemption from certain standards and targets;
- Extensions on timeframes for meeting defined targets;
- Eligibility for funding to assist with implementation, auditing, enforcement, monitoring and reporting, as well as information and technology requirements;
- Financial and technical support for training and capacity building;
- Knowledge and technology transfer, including through regional cooperation and twinning;
- Design of economic incentives and awareness raising campaigns.

UNIDO has played a role in the transfer of technology to developing countries under other agreements such as the Montreal Protocol,[280] assisting with phase-out plans for ozone-depleting substances as well as strengthening of regulatory frameworks.[281] A similar role could be undertaken for the adoption of plastic production and treatment facilities.

Assistance with the development of legislation can include implementation of licensing and permitting schemes for the various sectors in the lifecycle of plastics, from pellet producers (e.g. measures suggested under Operation Clean Sweep) to recycling and incineration facilities. The design of market based instruments to incentivize investment in collection, sorting and sustainable treatment infrastructure will be important to develop, particularly in hotspots where waste generation is high and services are non-existent or inadequate.

5.5.8. **Other mechanisms**

5.5.8.1. Information sharing

The transfer of information can assist developing countries to comply with their obligations under environmental agreements. There is also opportunity include developed countries in sharing Best Environmental Practices and worst practices, as well as examples of national legislation pitfalls and successes.

A clearinghouse mechanism facilitates transparency through access to data and is one method of sharing information. Data can be made available at a national, sub-regional, regional and international level. The clearinghouse tool can be leveraged on multiple levels towards combating marine plastic litter and microplastics, for example:

- Collection of data on plastic pollution, recovery and removal.
- A method to share skills and build capacity, as well as advertise the skills available in a region.

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[280] For information on the status of ratification of the Montreal Protocol, see United Nations Treaty Collection, *Montreal Protocol on Substances that Deplete the Ozone Layer. Status as at : 11-09-2017 07:31:29 EDT*, <https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-2-a&chapter=27&lang=en#1>, accessed 09 July 2017.

[281] United Nations Industrial Development Organization (UNIDO), *Montreal Protocol*, <http://www.unido.org/environment/implementation-of-multilateral-environmental-agreements/o5911901000.html>, accessed 3 June 2017.

- **Publication of country profiles, which can encourage State engagement and compliance.**

The data collected can assist in setting national and regional baselines and targets. Cooperation and stakeholder engagement is facilitated and contributions can be made from scientific and technical working groups, academia, NGOs and citizen science groups, amongst others. For example, the Intergovernmental Panel on Climate Change (IPCC) informs the UNFCCC and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) informs the CBD. Avenues for smaller scale solutions should be included for information sharing processes.

Minimum standards can be set for data collection to meet the necessary quality and reporting standards agreed at the international and regional level. National inventories could feed into regional clearinghouses, which in turn feed into a global clearinghouse.

5.5.8.2. Funding mechanism

UNCLOS does not exempt developing countries from the duty to protect the marine environment from pollution. However, when establishing global and regional rules, standards and recommended practices and procedures to prevent, reduce and control pollution of the marine environment from land-based sources, the economic capacity of developing States must be taken into account.[282] Developing States shall, for the purposes of prevention, reduction and control of pollution of the marine environment or minimization of its effects, be granted preference by international organizations in the allocation of appropriate funds and technical assistance, and in the utilization of their specialized services.[283] Many multilateral agreements that have incentivized global behavioral change have incorporated a funding mechanism that require developed States to provide the financial resources to developing States to assist with implementation of their obligations under the agreement.[284] These include ongoing obligations of monitoring and reporting, technical assistance and disaster response.

Funding will also be required to cover administrative activities, such as a Secretariat and regular COP and technical working group meetings. National committees could also be funded that include stakeholder engagement and meetings at the regional and sub-regional levels.

Some of the global financial mechanisms established include the International Oil Pollution Compensation Fund, the International Oil Pollution Compensation Supplementary Fund and the Multilateral Fund for the Implementation of the Montreal Protocol. The UNFCCC established the Least Developed Countries Trust Fund,[285] the Special Climate Change Trust Fund,[286] the Strategic Priority for Adaptation,[287] and the Adaptation Fund.[288] In addition, the Global Fund to Fight AIDS, Tuberculosis and Malaria was established independently of any international agreement.

Funding mechanisms can receive contributions from individual States on a voluntary or binding basis. Other sources of financial assistance have included the private sector, the G7 and G20, the Global Environment Facility (GEF) and the World Bank. As an example, the GEF provided 100 countries with the funding required in ratifying the Minamata Convention,[289] enabling these States to undertake their

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[282] 1982 Law of the Sea Convention., article 207(4).

[283] Ibid, article 194(1).

[284] For example, CBD, article 20; Stockholm Convention, Preamble; Montreal Protocol, article 10.1.

[285] United Nations Framework Convention on Climate Change (UNFCCC), *Part Two: Action Taken by the Conference of the Parties (FCCC/CP/2001/13/Add.1)*, Report of the Conference of the Parties on its Seventh Session, Held at Marrakesh from 29 October to 10 November 2001 (United Nations, 2002)., Decision 7/CP.7, para. 6.

[286] Ibid, Decision 7/CP.7, para. 2.

[287] Ibid, Decision 5/CP.7, para. 8.

[288] Ibid, Decision 10/CP.7, para. 1.

[289] As of 6 August, 2017, the Minamata Convention has 128 signatures, and 73 countries have deposited instruments of ratification, acceptance, approval or accession. See UN Environment, *Minamata Convention on Mercury. List of Singatories and Future Parties*,

Minamata Initial Assessments, as well as funding for 31 countries to develop their ASGM National Action Plans.[290] At the recent 52nd Meeting of the Global Environment Facility Council, sustainable consumption and production of plastics was raised as an emerging challenge, along with nanomaterials and new chemicals, with a further call for the GEF to play a strategic role in the reduction of microplastic waste.[291]

The binding measures agreed under a new international binding agreement to combat marine plastic litter and microplastics would be more likely to attract funding commitments than would voluntary measures, particularly where binding measures are linked to compliance measures. This, in turn, creates funding opportunities for States eligible for assistance under the agreement.

Economic instruments can encourage investment in infrastructure for collection, sorting and final treatment. A global tax on plastics is likely too difficult a challenge but funding mechanisms implemented at the national level, such as import, production and sales taxes, may assist in the costs of prevention, mitigation and removal. Schemes to promote recycling by creating value for plastic waste are also important.

The role of public private partnerships in supporting the implementation of actions to combat marine litter was promoted in the G-7 Action Plan to Combat Marine Litter[292] and should be further explored. This can include funding support mechanisms for researchers and scientists to evaluate the harmful impacts of larger plastic debris and microplastics in marine environments and on marine organisms and to develop effective tools to eliminate larger items of plastic debris and microplastics entering the environment.

5.5.8.3. Liability and Compensation

UNCLOS article 235 provides a foundation for liability for damage to the marine environment:

1) States are responsible for the fulfillment of their international obligations concerning the protection and preservation of the marine environment. They shall be liable in accordance with international law.
2) States shall ensure that recourse is available in accordance with their legal systems for prompt and adequate compensation or other relief in respect of damage caused by pollution of the marine environment by natural or juridical persons under their jurisdiction.
3) With the objective of assuring prompt and adequate compensation in respect of all damage caused by pollution of the marine environment, States shall cooperate in the implementation of existing international law and the further development of international law relating to responsibility and liability for the assessment of and compensation for damage and the settlement of related disputes, as well as, where appropriate, development of criteria and procedures

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<http://www.mercuryconvention.org/Countries/tabid/3428/Default.aspx>, accessed 6 August 2017.

[290] Global Environment Facility Council, *Initial Guideliens for Enabling Activities for the Minamata Convention on Mercury*, GEF/C.45/Inf.05/Rev.01, (Initial Guideliens for Enabling Activities for the Minamata Convention on Mercury) https://www.thegef.org/sites/default/files/council-meeting-documents/GEF.C.45.Inf_.05.Rev_.1_Initial_Guidelines_for_Enabling_Activities_for_the__Minamata_Convention_on_Mercury_Jan_23_2014_4.pdf>.

[291] IISD Reporting Services, *Summary of the 52nd Meeting of the Global Environment Facility Council*, <http://enb.iisd.org/gef/council52/html/enbplus192num17e.html>, accessed 28 June 2017.

[292] Germany, *G-7 Action Plan to Combat Marine Litter* (2015).

for payment of adequate compensation, such as compulsory insurance or compensation funds.

The 1999 Basel Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and Their Disposal (not yet in force) applies to "damage due to an incident occurring during a transboundary movement of hazardous wastes and other wastes and their disposal … from the point where the wastes are loaded … in an area under the national jurisdiction of a State of export" (article 3). Article 2 of the Protocol defines "damage" as:

- Loss of life or personal injury;
- Loss of or damage to property other than property held by the person liable in accordance with the present Protocol;
- Loss of income directly deriving from an economic interest in any use of the environment, incurred as a result of impairment of the environment, taking into account savings and costs;
- The costs of measures of reinstatement of the impaired environment, limited to the costs of measures actually taken or to be undertaken; and
- The costs of preventive measures, including any loss or damage caused by such measures, to the extent that the damage arises out of or results from hazardous properties of the wastes involved in the transboundary movement and disposal of hazardous wastes and other wastes subject to the Convention

The Protocol therefore deals with damage to human health, property and income and limits compensation for environmental damage to the cost of activities taken to repair damage and prevent further damage. The Protocol only applies to hazardous waste. A new agreement could provide a mechanism for determining liability and compensation for a State that fails to prevent the transboundary movement of non-hazardous waste originating from a single or diffuse source that is not covered by the Basel Protocol on Liability and Compensation. A new agreement would also need to address damage to human health from plastic additives not regulated under the Stockholm Convention.

A liability and compensation mechanism is yet to be agreed under the Stockholm Convention. A workshop on liability and redress under the Convention was held and some of the issues raised would apply to a new agreement for marine plastic litter and microplastics. These include:

- Responsibility versus liability,
- Establishment of a causal link between activities and damage,
- Identification of applicable activities and the establishment of a causal link with damage,
- Methods of assessing damage to human health,
- Damage to be covered, and
- Limitation of compensation.[293]

Other considerations noted in the compensation workshop apply to damage to both the environment and human health. These were the lack of definition for the environment, the challenges of measuring environmental damage and the differing nature of the pollutants. Clarification between State and civil liability will be required to establish what measures are appropriate for international law versus national law.

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[293] United Nations Environment Programme (UNEP), *Workshop on Liability and Redress Held in the Context of the Stockholm Convention on Persistent Organic Pollutants in Vienna From 19 to 21 September 2002: Report of the Co-Chairs*, UNEP/POPS/INC.7/INF/6 7, (UNEP/POPS/INC.7/INF/6) http://chm.pops.int/Portals/0/docs/from_old_website/documents/meetings/inc7/inf/en/inc7_inf6e.pdf>.

As with any instrument dealing with liability and compensation, consideration in the context of marine plastic litter and microplastics would need to be given to, at a minimum, the definition of damage, the measure of damage, responsibility, who can claim and what remedial activities can be claimed for. See the UN Environment Guidelines for the Development of Domestic Legislation on Liability, Response Action and Compensation for Damage Caused by Activities Dangerous to the Environment for more on this.[294]

Where the specific source of marine litter cannot be determined as it could for an incident of dumping or cargo loss, the concept of "loss and damage" as used in the Paris Agreement (article 8) may be appropriate to a new agreement for marine plastic litter and microplastics. Loss and damage resulting from the transboundary movement and gradual accumulation of marine plastic litter or microplastics resulting from wear and tear (through air or water) is comparable to "slow-onset events" as categorised in climate change discussions. Damage resulting from climate change originates from diffuse sources and occurs over time with a gradual impact, affecting multiple sectors. Slow-onset events are unlike a single oil pollution event or a transboundary movement of waste that can be traced to a source, which allow for determination of liability and financial compensation.

Areas identified under the Paris Agreement (article 8.4) as requiring further understanding, action and support that could apply to damage from marine plastic litter and microplastics are:

- Emergency preparedness (disaster response);
- Slow onset events;
- Events that may involve irreversible and permanent loss and damage;
- Comprehensive risk assessment and management;
- Non-economic losses; and
- Resilience of communities, livelihoods and ecosystems.

Loss and damage as expressed in the Paris Agreement would need to be extended to explicitly address damage to human health.

5.5.9. **Review**

The effectiveness of implementation and meeting the objectives of the agreement also require review processes. Clear objectives for an agreement are required for this process to provide value. Review mechanisms are important to maintain currency with emerging science, industry developments and global priorities. A regular review process that is informed by science and national inventories should be established to determine the effectiveness of a new legally binding agreement in reducing the quantities and impact of marine plastic litter and microplastics.

Examples can be found in provisions to measure success adopted under other instruments. Article 14(1) of the Paris Agreement requires that the "Conference of the Parties … shall periodically take stock of the implementation of this Agreement to assess the collective progress towards achieving the purpose of this Agreement and its long-term goals (referred to as the "global stocktake")."

Other methods of measuring effectiveness are the socio-economic benefits realized, including health benefits, from reductions in marine plastic litter and microplastics in air, water and biota. Section 4 provided some considerations for cost-benefit analyses of individual measures implemented at the national level, which are also a measure of effectiveness. The development and adoption of national legislation and action plans that give effect to internationally agreed measures are also important. In addition, the financial mechanism established under the new Agreement can be reviewed to determine effectiveness in meeting the changing needs of developing country Parties and Parties with economies in transition, that the level of funding addresses their needs and that the institutions operating the financial mechanism remain effective (as per the Stockholm Convention, article 13.8).

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[294] United Nations Environment Programme, *Guidelines for the Development of Domestic Legislation on Liability, Response Action and Compensation for Damage Caused by Activities Dangerous to the Environment* (Adopted by the Governing Council of the United Nations Environment Programme in decision SS.XI/5, part B of 26 February 2010, , 2010).

5.5.10. Relationship of the agreement with other instruments

An important inclusion in a new international legally binding instrument is the relationship of the agreement to existing MEAs and other treaties, such as GATT. This is similar to the mechanism of relationship established under UNCLOS (arts. 237 and 311). The new agreement would serve to close the gaps in the international, regional and sub-regional legal and policy frameworks, thus supplementing the instruments already in place or in progress.

5.6. Suggested Timelines and illustrative costs of a new global architecture

This section provides illustrative timelines to consider when balancing the three options presented in this Assessment. It does not suggest these courses of action are fixed for each option but is provided as a comparison only.

5.6.1. Option 2 Revise and strengthen existing framework, add components to address industry

Option 2 suggests strengthening the mandates of the Basel and Stockholm Conventions to improve the global management of marine plastic litter and microplastics. The conventions differ in their application to the issue, as do the options available under each convention.

Should the current mandate to consider relevant options available under the Basel Convention to further address marine plastic litter and microplastics lead to a decision to amend the Convention, for example adding a new protocol specific to plastics, the timeframes to achieve amendments must be considered. The COPs for both the Basel and Stockholm Conventions occur every two years, with the most recent taking place in May 2017. The next COP is scheduled for 2019.

There are 186 Parties to the Basel Convention. As per articles 17 and 18, amendments and new annexes are subject to similar procedure as for the Stockholm Convention, except that new annexes enter into force for those Parties accepting the annex six months after adoption.

As per articles 21 and 22 of the Stockholm Convention, amendments to the Convention or relevant annexes shall be adopted by a three-fourths majority vote of the Parties present and voting. There are currently 181 Parties to the Convention and amendments apply only to those that accept it, coming into force for those Parties 90 days after depositing instruments of ratification, acceptance or approval. New annexes are subject to the same procedure as amendments, but come into force one year after adoption for all Parties except those that have submitted written notification that they are unable to accept the new annex.

The Review Committee for the Stockholm Convention meet annually with the next meeting scheduled for October 2017. The Open-ended Working Group (OEWG) for the Basel Convention meet every two years and the last meeting was held in June 2017.

As a further example, the First to Tenth Sessions of the Ad Hoc Working Group of Legal and Technical Experts to consider and develop a Draft Protocol on Liability and Compensation for Damage Resulting from Transboundary Movements of Hazardous Wastes and their Disposal took place from 1993 to 1999. The Protocol was adopted in December 1999.

5.6.2. Option 3 New global architecture with multilayered governance approach

The timeframe for a new legally binding architecture to be agreed and to come into force could begin with the third UNEA meeting (UNEA-3) to be held 4-6 December 2017. A new intergovernmental body could be established at UNEA-3 and given the mandate to begin work on Phase I of option 3. The work of this body could be presented at the fourth United Nations Environment Assembly (UNEA-4) meeting in 2019. It is at UNEA-4 that a new body with a secretariat could be established, although this is likely to take place at a later stage.

While work under Phase I could begin at UNEA-3, work under Phase II could essentially also begin by ensuring steps taken under the voluntary umbrella agreement of Phase I work towards the same goals and objectives of a new binding architecture.

Should the decision be taken at UNEA-3 to progress with option 3:

- The decision could be made to adopt an Open Ended Working Group (OEWG) or an Intergovernmental Negotiationg Committee (INC),
- Following this, negotiation of a new international legally binding instrument could take to 3-4 years to complete.
- Depending on political commitment, a new agreement could come into force 4 years later.

To illustrate the timeframe for a new architecture to be adopted, the Minamata Convention on mercury can serve as an example. It must, however, be stressed that the process for different agreements varies and this serves only as an example.

Table 9: Comparative timeline for the Minamata Convention

Minamata Convention on mercury[295]	**Binding architecture on marine plastic litter**
• 2007 - Feb, GC 24: decision to establish Open Ended Working Group "to review and assess options for enhanced voluntary measures and new or existing international legal instruments." • 2007 - First Open Ended Working Group meeting. • 2008 - Second Open Ended Working Group meeting. • 2009 - Open Ended Working Group to prepare for the first Intergovernmental Negotiating Committee. • 2009 - Decision 25/5 was adopted on the development of a global legally binding instrument. • 2010 - 2013 - Five meetings of the intergovernmental negotiating committee, • 2013 - One Preparatory Meeting prior to adoption of text (2 days).	• 2017 - Establish intergovernmental body to develop Phase I. • 2018 - First Open Ended Working Group meeting. • 2018 - Establish international negotiating committee. • 2019 - Second Open Ended Working Group meeting. • 2019 - Adopt Decision on the development of a global legally binding instrument at UNEA-4. • 2019 - Establish body with secretariat • 2019 - 2023 - Five meetings of the intergovernmental negotiating committee. • 2023 – **adopt text and open for signature.** • Entry into force - 4 years suggested, subject to political will.

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[295] UN Environment, *Minamata Convention on Mercury. History of the Negotiations Process*, <http://www.mercuryconvention.org/Negotiations/History/tabid/3798/Default.aspx >, accessed 23 June 2017.

• **2013 - text adopted at Conference of Plenipotentiaries and opened for signature.** • 2014 - sixth meeting of intergovernmental negotiating committee on mercury prior to first COP to facilitate an expedited entry into force of the Convention. • 2016 - seventh meeting of intergovernmental negotiating committee to expedite entry into force. • 2017 - **Convention enters into force.**	

The intergovernmental negotiating committee was supported by the Chemicals Branch of the UN EnvironmentEnvironment Division of Technology, Industry and Economics acting as secretariat.

Support from staff at UN Environment would need to be considered in these illustrative costs. A further consideration is the comparison of these possible timelines illustrated above for a new architecture with the following estimates of a recent study:

- 8,300 million metric tons (Mt) of virgin plastics have been produced to date,
- 6,300 Mt of plastic waste has been generated as of 2015,
- Of this waste, 9% has been recycled, 12% incinerated, and 79% has accumulated in landfills or the natural environment.
- 12,000 Mt of plastic waste will be in landfills or in the natural environment by 2050 under current production and waste management trends.[296]

These estimates support the need for urgent action to address the flow of plastic litter and microplastics into the marine environment.

6. Opportunities

UNEA-3 provides a forum for global policymakers to assess the current legal and policy framework and decide whether the current and future ecological, social and economic impacts of marine plastic litter and microplastics warrant action to strengthen this framework at the international, regional and sub-regional levels. A number of initiatives are underway and various platforms have been established around the world. UN Environment can play an important role in aligning these efforts, together with other relevant UN departments with knowledge in, inter alia, business and chemical management. UN Environment also has the capability of conducting assessments, promoting government action and supporting implementation of existing and new legal regimes.

Collaboration between intergovernmental organisations can be enhanced. For example, initiatives undertaken by the G20 and G7 include the initiation of the G7 Action Plan to Combat Marine Litter 2015, which was followed in 2017 with a new G20 Action Plan on Marine Litter. In addition, a new voluntary platform, the Global Network of the Committed (GNC) was established to facilitate implementation of the action plan.[297] Regional centers have also been established for some marine protected areas that can be drawn on for regional collaboration.[298]

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[296] Geyer, R. et al, above n 5.

[297] The Federal Government of Germany, *G20 Conference. Alliance to reduce marine litter*, <https://www.bundesregierung.de/Content/EN/Artikel/2017/06_en/2017-06-01-meeresmuell_en.html>, accessed 22 July 2017.

[298] Examples include MedPAN (Mediterranean), CaMPAM (Wider Caribbean), RAMPAO (West Africa), WIOMSA (West Indian Ocean), Maia (Atlantic), Panache (English Channel), NEAMPAN (North-East Asia), NAMPAN (North America)

The Fisheries and Aquaculture Innovation Platform (FAIP) is an example of a platform that connects researchers and policy makers in OECD countries. The aim is to identify policies, research centers and projects in order to connect research partners, but also provide information on the latest innovations. Indicators are provided to measure the performance and impact of policies within the sector.[299] Other activities include consultation under the FAO for the marking of fishing gear and decisions adopted by Regional Fisheries Bodies.

Forums that provide opportunity for policymakers to keep up to date on the latest industry trends will be important when developing policies, legislation and approaches at the local level. Without global definitions and standards, e.g. for biodegradable plastics, legislation may be drafted based on flawed information. This would include decisions on sustainable long-term options for end-of-life treatment of plastic waste. This will enable policymakers to consider the possible constraints legislation may place on future innovation that leads to improved environmental outcomes.

In addition to regulatory frameworks, partnerships or voluntary agreements between public- and private sector can contribute to combat marine plastic litter and microplastics. Collaboration between multiple stakeholders and government can be achieved through, for example, the Green Deal approach initiated in the Netherlands.[300] Through such partnerships, concrete actions can be agreed for improved sustainability on a national and an international level.

As discussed in Section 3, the various sectors of the plastics industry have trended towards regional and global associations that represent the interests of their members. A number of these associations provide a platform for discussion and collaboration across the entire lifecycle of plastics. Some include participation by academia and NGOs. There are associations that represent particular applications of plastic products, such as AMERIPEN[301] in the US, which aims to "lead the packaging industry through advocacy based on science, and enhance understanding of the role packaging plays in a more sustainable society, economy, and environment." A platform that consolidates decisions and findings by the various industry associations, verified by scientific research and accredited NGOs, could streamline the flow of information to intergovernmental organizations, policymakers and civil society. This platform can also facilitate industry-led design criteria that simplify recycling processes and enable the recycling of a greater percentage of plastics.

Similarly, a platform that enables entrepreneurs and researchers working towards sustainable alternative materials and practices to publicize ideas and solutions would enable open discussion on the net environmental benefits provided. Opportunities for investment may also be presented through such a platform.

There is opportunity to encourage States to establish national authorities dedicated to the coordination and improvement of prevention, mitigation and clean-up efforts for marine litter and microplastics. Such authorities would benefit from a clearinghouse that provides working examples of policies, legislation, strategies and best practices in place around the world, from national to local levels. Sharing of worst practices can also be beneficial.

The need for better scientific and technical knowledge and understanding is a key factor in any collaborative processes or platforms established and should be an objective of any new developments in this area. This requires not only the provision of information, but also the analysis of such information in the relevant context. The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) can provide such services and recently attended the G7 and the G20 workshops on marine litter.

Community engagement in cleanup efforts can assist in awareness-raising programs and may encourage behavioral change in a limited section of the global population. As per Goal C of the Honolulu Strategy, cleanups should be further encouraged and support provided for remote areas where access is difficult and removal of collected debris and fishing gear is expensive.

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[299] OECD, *Fisheries and Aquaculture Innovation Platform (FAID)*, <www.oecd.org/fisheries-innovation >, accessed 22 July 2017.

[300] Dutch Central Government, above n 200.

[301] American Institute for Packaging and the Environment (AMERIPEN), *Home*, <http://www.ameripen.org >, accessed 24 July 2017.

7. Conclusions and Recommendations

The issue of marine plastic litter has raised the profile of plastic waste in general and has brought the wider issue of waste into focus at the global and regional levels. The policy response to date has mostly focused on remedying the shortcomings of solid waste management processes. Should current trends persist, pollution of our oceans by plastic waste would continue. Research is providing greater insights into how this waste is entering our oceans and the fate of those plastics once there. But there is a clear need to investigate solutions upstream. This assessment begins this discussion and provides options to progress the policy and governance response towards a holistic lifecycle approach.

Sources and quantities of marine plastic litter vary greatly by region, with some areas more likely to contribute through loss and abandonment of synthetic fishing gear and others contributing from the mismanagement of post-consumer waste near coastal zones and waterways. Some solutions and technologies may be more appropriate to specific regions than others, but all should consider the waste hierarchy of the 6Rs.

Annex 9.4 provides a summarized guide on immediate- to long-term approaches, noting that technologies such as incineration should only be implemented as a transitional measure. The economic analysis of proposed measures is critical and in many smaller countries perhaps cannot be done in isolation of other economic incentives and disincentives in all sectors which either depend on plastics or generate plastics e.g. tourism, manufacturing and retail. Non-economic incentives should also be explored that help enable private sector involvement and facilitate behavior change.

Research continues to identify and quantify sources of microplastics. Although pre-production plastic pellets and microbeads from cosmetics are the smallest contributors within this category,[302] understandably most efforts to prevent microplastics entering waterways and coastal zones have focused on their containment given they are a known source of direct entry into the aquatic environment. Other sources include abrasion of textiles, tires, fishing gear and aquaculture infrastructure but these sources have received little attention for mitigation options. This disparity calls for an integrated approach to microplastics that addresses all sources.

The impacts on marine organisms have been established for some plastic additives.[303] However, the risks to human health from direct exposure to additives contained in plastic products or via the marine food web are not conclusive. Taking into account the precautionary principle, the available knowledge is sufficient to trigger preventive measures.

7.1. Current frameworks and gaps

The current legal and policy framework at the international, regional and sub-regional level does not provide a comprehensive global strategy that adapts to industry innovation and emerging scientific evidence and does not provide a collaborative platform for all stakeholders and polluters. ThisThis framework can be grouped into instruments that (i) aim to prevent pollution, (ii) protect biodiversity and species, and (iii) regulate the manufacture, use and disposal of chemicals and waste.

No global agreement exists to specifically prevent marine plastic litter and microplastics or provide a comprehensive approach to managing the lifecycle of plastics. The regional framework is also fragmented in this regard. The Convention on Biological Diversity iesapplies to the protection of the environment from chemicals and microplastics, placing greater focus on impacts to populations and assemblages, but would not apply directly to human health. The Basel Convention focuses on plastics in the waste phase, mainly regulating the transboundary movement of plastic waste, but establishes a general duty for Parties to reduce the generation of plastic waste, providing non-binding guidelines in this regard. The Stockholm Convention does not regulate all chemical additives used in plastic products.

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[302] Boucher, J. and Friot, D., above n 191.

[303] Mathieu-Denoncourt, J. et al, 'Plasticizer endocrine disruption: Highlighting developmental and reproductive effects in mammals and non-mammalian aquatic species' (2014) 219(0) *General and Comparative Endocrinology* 74-88.

The risks to human health from chemical additives are poorly represented in binding instruments. The Stockholm Convention provides protection only for a limited number of persistent organic pollutants used in the manufacture of plastics. The rapid innovation of plastics, particularly in the application of packaging, and the length of time to amend the Convention make this an unsuitable instrument to keep up with industry trends.

Three global agreements explicitly prohibit the discharge of plastic waste into the marine environment. The United Nations Convention on the Law of the Sea establishes a general duty to protect and preserve the marine environment and to prevent, reduce and control pollution from all sources, including from land-based sources, dumping and vessels. Measures to prevent sea-based sources of marine pollution, including plastics, are further elaborated in the London Protocol and MARPOL Annex V. These instruments essentially ban sea-based sources of marine plastic litter in all maritime zones including internal marine waters. HoweverHowever, there are implementation and compliance challenges concerning IMO instruments.

Fourteen of the eighteen Regional Seas have adopted overarching conventions for the conservation and sustainable management their shared sea, with one convention not yet in force. Of these fourteen regions, nine have adopted protocols specific to land-based sources of pollution[304] but only five are in force. Six regions have adopted action plans specific to marine litter, with one additional region under development and an existing action plan under review. Solid waste management and wastewater treatment are better represented in the non-binding instruments of the Regional Seas instruments. Approaches vary considerably and reflect regional differences in geography, culture and capacity. Protocols that prohibit the direct dumping into the oceans of wastes that contain plastics have been developed for the three regions. Coastal dumping and the location of landfills near waterways and coastlines are also not equally addressed across all regions.

Measures to regulate industrial waste are provided in the binding and voluntary instruments of nearly all Regional Seas. However, the application of these measures must be extended to include compliance with existing programmes that target zero pellet loss from industrial facilities. Compliance with water and air quality standards could be incorporated into lifecycle assessments to reduce the generation of microplastics from wear and tear during product use.

The largest gap identified is the lack of an international body with the mandate to regulate land-based sources of marine pollution. An international body is in place for the management of marine sources of pollution through the IMO and the GPA is recognized as the competent international organization for land-based sources as per UNCLOS article 207(4). The mandate of the Regional Seas is mostly limited to the relevant convention areas, with only five regions including the high seas in the duty to prevent harm. Not all States are party to a binding Regional Seas convention, leaving geographic gaps in the duty to protect the marine environment.

As this summary has shown, plastics present a complex problem that will require a broad approach that incorporates regional differences. Existing instruments provide measures to manage different aspects of the broader issues, but gaps exist across the global lifecycle of plastics.

7.2. Options for addressing marine plastic litter and microplastics

There is increasing recognition that prevention upstream in the lifecycle of plastics is more cost-effective than mitigation and removal efforts downstream. Prevention will involve the cooperation of the various sectors of the plastics industry, from resin manufacturers to recycling and recovery facilities. Marine plastic litter and microplastics are high on the agenda of policymakers as well as industry associations. This provides a fertile environment to discuss the options available to strengthen the current legal and policy framework at the international and regional levels.

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[304] The 1991 Protocol on Environmental Protection to the Antarctic Treaty - Annex III Waste Disposal And Waste Management (1998) is not included in this table as it is not specific to LBS/A.

As shown in this assessment, the mandates of the existing agreements that have some degree of application to marine plastic litter and microplastics are restricted in their scope. An international body is required that, at a minimum, can coordinate and strengthen efforts currently proceeding under various instruments. This can be a new body or a strengthened existing body.

Strengthening the current legal and policy frameworks requires greater incorporation of the principle of sustainable development. This will encompass goals for sustainable cities and communities, chemicals management, reductions in production of waste and pollution, as well as protection of the marine environment. A new/strengthened international body must encourage compliance with the Sustainable Development Goals relevant to the broader issues, not only SDG14.

It is highly recommended that binding Regional Seas conventions and protocols for the prevention of land-based sources of marine pollution be adopted where there are currently no such binding instruments and, in all regions where these instruments are still pending, steps are taken for them to enter into force. First-generation instruments that do not adequately address pollution by plastic waste and additives should be amended to include measures specific to marine plastic litter and microplastics. Action plans specific to marine litter must be adopted and updated where appropriate.

To further improve the effectiveness of a new or strengthened international body, an overarching voluntary agreement can be developed that sets voluntary targets for national reduction of marine plastic litter and microplastics. Guidelines can be established in collaboration with all sectors of the plastics industry that encourage compliance with agreed design criteria, as well as use of polymers and additives. Voluntary global labeling and certification schemes can incentivize sustainable manufacturing processes as well as responsible disposal by consumers.

Global, regional and national reporting can be standardized across Regional Seas, industry sectors and multilateral agreements with targets and regulations applicable to marine plastic litter and microplastics. This will further the knowledge and analysis of regional differences of waste profiles and the various sectors of the plastics industry.

The above suggestions can be greatly facilitated by the development of a new international legally binding instrument to combat marine plastic litter and microplastics. This new architecture would build on the suggestions presented in option 2, but combine binding and voluntary measures into a multi-layered governance approach that promotes engagement by States and industry sectors, while allowing for regional differences.

As adopted in the Paris Agreement, States could determine their individual national reduction targets, but the revision and improvement of these targets would be mandatory. An obligation would be established to maintain national inventories, comply with agreed labeling and certification schemes and meet regional and international report requirements based on binding global standards.

The Montreal Protocol and the National Sword policy of China could provide a model for the regulation of international trade in non-hazardous plastic wastes. Receiving facilities must meet minimum environmental standards, as would be the case for technologies exported.

The processes presented for a new global architecture could be streamlined by initiating voluntary efforts (Phase I) while designing a new legally binding international agreement (Phase II). The processes could also be expedited should UNEA give an immediate parallel mandate for Phase I and Phase II of option 3. This would allow for efficiency in the resources required, as well as the alignment and strengthening of the outcomes. Consideration must be given to the illustrative timelines highlighted for establishing the suggested architecturearchitecture versus the parallel increase in production of plastics and the resulting plastic waste.

In the immediate future following UNEA-3, there is opportunity to develop voluntary initiatives that can work towards an overarching multilayered governance approach. This includes collaborative platforms that facilitate information and technology flow between industry sectors, intergovernmental organizations, academia, researchers, government authorities and civil society.

The issue of marine plastic litter and microplastics has been on the agenda of many intergovernmental institutions for a number of years, but is also of concern to international and regional industry associations. It is therefore at this bi-annual meeting of the United Nations Environment Assembly that the current momentum must be translated into political action at the international level in order to drive the urgent revisions of the legal and policy frameworks for lasting improvements. The oceans are subjected to many cumulative impacts from which they are now visibly suffering. Marine plastic litter and microplastics is one such impact the world can solve if we have the political will.

Marine plastic litter and microplastics result from a failure of processes, mostly those on land. It is the role of the legal and policy frameworks to establish the duty to prevent, mitigate and remediate such pollution of the marine environment. This assessment has shown a considerable number of varied initiatives at both the global and regional level, some in place for a number of years. However, these are not coherently integrated and or sufficiently comprehensive to deal with the issue at a global scale.

UNEA-3 provides a platform to reassess the situation and realign the current framework with the fundamental changes required at the industry level to combat the issue of marine plastic litter and microplastics. Consideration must be given to the feasibility of each of the three options presented here and balanced against the continual rate of production of plastic products.

Industry has shown initiative in this space, investing funds into research and solutions. The options for progressing these efforts towards voluntary industry-led and self-regulated mechanisms must be explored. Regional and global industry associations can provide the platform for these collaborations.

Avenues to replicate successes within the Regional Seas Programme must be explored and funding provided to those Regional Seas programmes lacking the capacity to implement proven strategies and approaches, as well as the necessary monitoring and reporting. Examples of cooperation and information sharing between regions exist and these must be facilitated in regions that require assistance. There are significant data gaps in some regions that must be filled before targeted policy options can be explored.

Gaps exist in the scientific knowledgebase, including the effects of nanoplastics and chemical additives on assemblages and populations. Prioritizing research into methodologies for assessing the effects of these on marine species and humans can assist in providing robust data sets to identify trends at a local, regional and global level.

The recent import bans on most plastic wastes by China has highlighted the need to manage the trade of plastic wastes at the global level. The international trade of plastic waste could benefit from standards that provide transparency and stability to this sector. Managing the global trade in plastic waste, combined with targets for recycled content and adequate landfill taxes, can help stabilize the end-market for end-of-life plastics, reduce the need for virgin material and contribute to reductions in greenhouse gas emissions.

Labeling schemes have already been developed to inform the public on the correct method to recycle products. Such schemes can be expanded to create awareness and change behavior while working towards a cleaner waste stream that reduces the costs of recycling. These and other self-regulatory industry standards will require coordination and collaboration between all sectors.

National inventories as outlined in this assessment can be employed to improve reporting in those regions where the production, consumption and final treatment of plastics and waste is poorly understood. National reduction targets can also be set, as have been established in some regions and national action plans. A strengthened international body can provide encouragement to implement both measures on an initial voluntary basis. Those countries lacking the necessary capacity may require assistance in implementation and meeting reporting targets.

A platform for information sharing will facilitate the dissemination of best practices, policies and legislation specific to the issue. Technical solutions and entrepreneurial options for large and small-scale applications can be shared, including those specific to regional differences.

Bearing in mind the UN-Oceans mechanism, consideration must be given to its strengthening in the context of the review of its terms of reference[305] or the establishment of a new global body specific to the issue of marine plastic litter and microplastics that can coordinate the current efforts by various institutions and harmonise the approaches. There are multiple strategies across multiple instruments and most are not specific to the issue of marine plastic litter and microplastics. A coordinating body can maintain the issue on the agenda of the various secretariats, promote the measures suggested under Phase I of option 3 and facilitate discussions towards Phase II of option 3.

This assessment has mapped the current governance strategies and approaches at the international, regional and sub-regional levels and outlined progress and efforts under a number of instruments. These efforts will provide some degree of progress, but combined may not reach the desired outcomes at a global level of protecting the environment, human health and food security.

A long-term and holistic approach will begin with the strengthening of current efforts and focusing on each aspect of the lifecycle of plastics. Voluntary measures can provide a strong foundation for a new global architecture that combines voluntary, self-regulatory and binding measures. The United Nations Environment Assembly may consider possible policy options presented in this study to accelerate global efforts to address marine litter. The right to a healthy environment for current and future generations requires a shift in policy direction if the current flow of plastic litter and microplastics into the environment is to be checked.

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[305] The General Assembly decided to review the terms of reference of UN-Oceans at its seventy-second session. See United Nations General Assembly (UNGA), *Oceans and the law of the sea*, A/RES/68/70, 68, (UNGA Resolution 68/70) (9 December 2013) <http://www.un.org/depts/los/general_assembly/general_assembly_resolutions.htm>., para. 279.

References

[See end of document for bibliography. To be formatted prior to final editing.]

8. Annexes

8.1. Full titles of Regional Seas instruments

Regional Seas Programme	Action Plans for Protection of the Marine Environment (voluntary)	Regional Conveation (year entered into force)	LBS/A Protocol (year entered into force)	Action Plans/Strategies Specific to Marine Litter (voluntary)
North-East Pacific	2002 Plan of Action for the Protection and Sustainable Development of the Marine and Coastal Areas of the North-East Pacific	2002 Antigua Convention* Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific <http://wedocs.unep.org/bitstream/handle/20.500.11822/11134/nep_convention_es.pdf?sequence=1&isAllowed=y.>		Under develoment
ROPME Sea	1978 Action Plan for the Protection of the Marine Environment and the Coastal Areas of Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates	1978 Kuwait Agreement (1979) Kuwait Regional Convention for Co-Operation on the Protection of the Marine Environment from Pollution <http://ropme.org/home.clx#>.	1990 Protocol for the Protection of the Marine Environment against Pollution from Land-Based Sources (1993) <http://www.ropme.org/uploads/protocols/land_based_protocol.pdf>.	Under development
South-East Pacific	1983 Action Plan for the protection of the marine environment and coastal areas of the South-East Pacific	1981 Lima Convention (1986) Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific <http://www.cpps-	1983 Protocol for the Protection of the South-East Pacific Against Pollution from Land-Based Sources (1986)	2007 Regional Action Plan on Marine Litter in the South-East Pacific (CPPS) Region

		int.org/cpps-docs/pda/biblioteca/convenios/convenio_proteccion_medio_marino_lima1981.pdf>	<http://cpps.dyndns.info/cpps-docs-web/planaccion/docs2016/Mayo/protocolo-proteccion-contaminacion-fuentes-terrestres.pdf>.	
North-East Atlantic	2002 Regional Plan of Action 2010-2020 Strategy of the OSPAR Commission for the Protection of the Marine Environment of the North-East Atlantic	1992 OSPAR Convention (1998) Convention for the Protection of the Marine Environment of the North-East Atlantic <http://www.ospar.org/convention/text>.	1992 OSPAR Convention (1998) - Annex I On the Prevention and Elimination of Pollution from Land-based Sources	2014 North East Atlantic Marine Litter Regional Action Plan
Mediterranean	1995 Action Plan for the Protection of the Marine Environment and the Sustainable Development of the Coastal Areas of the Mediterranean	1976 Barcelona Convention (1978) – amended 1995 (2004) Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean <http://wedocs.unep.org/bitstream/id/53143/convention_eng.pdf>	1996 Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities, as amended 7 March 1996 <http://wedocs.unep.org/bitstream/handle/20.500.11822/7096/Consolidated_LBS96_ENG.pdf?sequence=5&isAllowed=y >	2013 Regional Plan on Marine Litter Management in the Mediterranean in the Framework of article 15 of the Land Based Sources Protocol (Decision IG.21/7) **(binding)** <http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/pdf/decision_21_7_marine_litter_mediteranien.pdf>
Black Sea	2009 Strategic Action Plan for the Environmental Protection and Rehabilitation of the Black Sea	1992 Bucharest Convention (1994) Convention on the Protection of the Black Sea against Pollution <http://www.blacksea-commission.org/_convention.asp>	1992 Protocol on the Protection of the Black Sea Marine Environment against Pollution from Land-Based Sources (1994) <http://www.blacksea-commission.org/_table-legal-docs.asp#odbsc>	Report: 2007 Marine Litter in the Black Sea Region (Ch 7: Proposals for Changes)** **Marine Litter Action Plan – drafted, to be proposed for adoption in Oct, 2017**

			2009 Protocol on the Protection of the Marine Environment of the Black Sea from Land Based Sources and Activities* <http://www.blacksea-commission.org/_convention-protocols.asp>	Marine Litter Action Plan – under development
Wider Caribbean	1983 Action Plan for the Caribbean Environment Programme	1983 Cartagena Convention (1986) Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region <http://www.cep.unep.org/cartagena-convention/text-of-the-cartagena-convention >	1999 Protocol Concerning Pollution from Land-Based Sources and Activities to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (2010) <http://www.cep.unep.org/cartagena-convention/lbs-protocol/lbs-protocol-english/view>.	2008 Wider Caribbean Regional Action Plan on Marine Litter 2014 – Regional Action Plan on Marine Litter Management (RAPMaLI) for the Wider Caribbean Region - Revised Action Plan
Red Sea & Gulf of Aden	1976 Action Plan for the Conservation of the Marine Environment and Coastal Areas of the Red Sea and the Gulf of Aden (revised 1995)	1982 Jeddah Convention (1985) Regional Convention for the Conservation of the Red Sea and Gulf of Aden <http://www.persga.org/Documents/Doc_62_20090211112825.pdf>.	2005 Protocol concerning the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden* <http://www.persga.org/Documents/Doc_62_20090211124355.pdf> .	Report: 2008 Red Sea & Gulf of Aden – Marine Litter in the PERSGA Region (Ch3: Strategies and Actions)**
Eastern Africa	1985 Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region	1985 Nairobi Convention (1996) – amended 2010* Convention for the Protection, Management and Development of the Marine and Coastal	2010 Protocol for the Protection of the Marine and Coastal Environment of the Western Indian Ocean from Land-Based Sources and Activities*	Report: 2008 A Regional Overview & Assessment of Marine Litter Related Activities in the West Indian Ocean Region (Ch 3-4: Priorities and

		Environment of the Eastern African Region <http://www.unep.org/NairobiConvention/The_Convention/index.asp>	< http://www.unep.org/nairobiconvention/protocol-protection-marine-and-coastal-environment-wio-land-based-sources-and-activities> <http://www.unep.org/nairobiconvention/protocol-protection-marine-and-coastal-environment-wio-land-based-sources-and-activities?>	Recommendations for Action in Marine Litter Management)** **Action plan under development**
Western Africa	1983 Action Plan for the Protection and Development of the Marine Environment and Coastal Areas of the West and Central African Region	1981 Abidjan Convention (1984) Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region <http://abidjanconvention.org/index.php?option=com_content&view=article&id=100&Itemid=200&lang=en?	2012 Additional Protocol to the Abidjan Convention Concerning Cooperation in the Protection and Development of Marine and Coastal Environment from Land-Based Sources and Activities in the Western, Central and Southern African Region* <http://abidjanconvention.org/media/documents/protocols/LBSA%20Protocol-Adopted.pdf>.	**Potential assessment**
Caspian Sea	2003 Strategic Convention Action Programme	2003 Tehran Convention (2006) Framework Convention for the Protection of the Marine Environment of the Caspian Sea <http://www.tehranconvention.org/IMG/pdf/Tehran_Convention_text_final_pdf.pdf>	2012 Protocol for the Protection of the Caspian Sea Against Pollution from Land-based Sources and Activities to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea* <http://www.tehranconvention.org/IMG/pdf/Protocol_on_Pollution	Report: 2009 Marine litter in the Caspian Region: Review and Framework Strategy (Ch 6: Recommended measures for marine litter mitigation in the Caspian)**

			_from_Land_Based_Sources_and _Activities.pdf>	
Antarctic		1959 Antarctic Treaty (1961) 1980 Protection of Marine Living Resources (1982) Convention on the Conservation of Antarctic Marine Living Resources <http://www.ats.aq/documents/ats/ccamlr_e.pdf>.	1991 Protocol on Environmental Protection to the Antarctic Treaty - Annex III Waste Disposal and Waste Management (1998) <https://www.ats.aq/documents/recatt/Att006_e.pdf >	
Pacific	SPREP Strategic Plan 2017-2026	1986 Noumea Convention (1990) Convention for the Protection of the Natural Resources and Environment of the South Pacific Region <https://www.sprep.org/legal/noumea-convention>.		Marine Litter Action Plan – under development
Baltic	2007 HELCOM Baltic Sea Action Plan	1992 Helsinki Convention (2000) Convention on the Protection of the Marine Environment of the Baltic Sea Area < http://www.helcom.fi/Documents/About%20us/Convention%20and%20commitments/Helsinki%20Convention/1992_Convention_1108.pdf>	1992 Helsinki Convention - Annex III Criteria and Measures Concerning the Prevention of Pollution from Land-based Sources	2015 HELCOM Regional Action Plan for Marine Litter in the Baltic Sea

North-West Pacific (NOWPAP)	1994 Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region			2008 NOWPAP Regional Action Plan on Marine Litter
South Asian Seas	1995 Action Plan for the Protection and Management of the Marine and Coastal Environment of the South Asian Seas Region - ANNEX IV: Protection of the Marine Environment from Land-based Activities			Report: 2007 Framework for Marine Litter Management in the South Asian Seas Region (Part 2 of Review Of Marine Litter in the SAS Region)** Marine Litter Action Plan under development
East Asian Seas	2000 Regional Programme of Action for the Protection of the Marine Environment of the East Asian Seas from the Effects of Land-based Activities.			2008 COBSEA Regional Action Plan on Marine Litter - **revision in progress**
Arctic	2009 Regional Programme of Action for the Protection of the Arctic Marine Environment from Land-based Activities			

* Not in force

** Recommendations only, no Action Plan on Marine Litter

8.2. List of targets in marine litter action plans

Instrument	Language	Target	Timeline
Regional Plan on Marine Litter Management in the Mediterranean (2013)	To base urban solid waste management on reduction at source		2025
	To implement adequate waste reducing/reusing/recycling measures	To reduce the fraction of plastic packaging waste that goes to landfill or incineration.	2019
	To take necessary measures	Adequate urban sewer, wastewater treatment plants, and waste management systems to prevent run-off and riverine inputs of litter.	2020
	Explore and implement to the extent possible	- Charge reasonable cost for the use of port reception facilities - No-Special-Fee system - Fishing for Litter" system, - Gear marking - 'reduced ghost catches through the use of environmental neutral upon degradation of nets, pots and traps concept'	2017
	Necessary measures	To prevent any marine littering from dredging activities in accordance with the relevant guidelines adopted in the framework of Dumping Protocol of the Barcelona Convention	2017
	Necessary measures	To close the existing illegal dump sites.	2020
Baltic Marine Environment Protection Commission Marine litter action plan (2015)	Explore and implement to the extent possible the measures	Removal of existent accumulated litter based on sound environmental management and cost effective manner	2019
	Remediation and removal actions Produce	Region-wide map of landfills or dumpsites including historic ones that may eventually pose a risk to the marine environment	2020
	Remediation and removal actions: fishing activities	Mapping of snagging sites or historic	2017 for mapping

		dumping grounds and a risk assessment for identifying where accumulation of ghost nets pose a threat to the environment and should be removed.	2018 for risk assessment
	Remediation and removal actions: Fishing activities	Based on the risk assessment conducted in RS10 and identification of accumulation areas, initiate removal of ghost nets and their safe management on land.	No date
OSPAR Commission Marine litter regional action plan (2014)	Removal Actions: Fishing To strengthen	OSPAR Recommendation 2010/19 on the reduction of marine litter through implementation of fishing for litter initiatives.	2016
	Removal Actions: Fishing Establish	Exchange platform on experiences on good cleaning practices in beaches, riverbanks, pelagic and surface sea areas, ports and inland waterways. Develop best practice on environmental friendly technologies and methods for cleaning.	2016
	Removal Actions: Fishing To develop	Sub regional or regional maps of hotspots of floating litter, and identification of hotspots of accumulation on coastal areas and the role of prevailing currents and winds.	2018
	Removal Actions: Fishing	Reduction of abandoned, lost and otherwise discarded fishing gear (ALDFG)	No date
	Removal Actions: Fishing Identify	Mapping hot spot areas through mapping of snagging sites or historic dumping grounds.	No date
	Removal Actions: Fishing To develop	Risk assessment for identifying where accumulations of ghost nets pose a threat to the environment and should be removed.	On-going
	Reduction of sewage and storm water related waste Investigate and promote with appropriate industries	Use of Best Available Techniques (BAT) and Best Environmental Practice (BEP) to develop sustainable and cost-effective solutions to reduce and prevent sewage and storm water related waste entering the marine environment, including micro particles.	2017

	Reduction of sewage and storm water related waste Assess	Relevant instruments and incentives to reduce the use of single-use and other items, which impact the marine environment.	2016
	Reduction of sewage and storm water related waste Assess		
	Reduction of sewage and storm water related waste Reduce	Consumption of single use plastic bags and their presence in the marine environment, supported by the development of quantifiable (sub) regional targets.	2015
	Reduction of sewage and storm water related waste Encourage	International environmental certification schemes to include the management and prevention of marine litter in their lists of criteria.	2016
NOWPAP Regional Action Plan on Marine Litter (2008)	Removal of Existing Marine Litter Encouraged to undertake	- Designate a responsible authority or contract a private entity or interested NGOs in order to undertake regular removal operations. - Facilitate and support public participation. - Establish partnerships with civil society and private sector (industry).	No date
	Marine Litter Collection in Fishing Sector Encouraged to undertake	-Develop and apply measures to remove and collect fisheries-related marine litter efficiently; - Develop and use marked fishing gear -Develop and implement national projects or programmes on fisheries-related marine litter, taking into account good practices - Facilitate and promote fishermen participation in the marine litter collection.	No date
COBSEA Regional Action Plan on Marine Litter (2008)	Preventing and reducing marine litter from land-based sources Encourage and assist countries	- Adopt legal and economic instruments. - Promote integrated waste management systems for major municipal areas and coastal towns and villages, including the waste management principles of Reduce, Re-use and Recycle (3R). - Implement litter prevention and interception systems in urban catchments.	No date

		- Provide technical training and capacity building to staff from national and municipal governments - Develop and implement award-based incentive schemes for coastal villages, towns and cities that have integrated waste management systems.	
	Preventing and reducing marine litter from sea-based sources Encourage and assist countries	- Adopt legal and economic instruments. - To become party to and implement MARPOL Annex V. - To consider a regional review of the adequacy of port waste reception facilities and publish a Regional Directory. - Adopt a coordinated regional approach to port waste reception facilities, based on a "General Fee" cost recovery basis. - Provide technical training and capacity building to staff from national governments, port authorities and the shipping industry.	No date
	Preventing and reducing Lost and Abandoned Fishing Gear (ALDFG) Encourage and assist	- Regional fishing industry to better implement/comply with the FAO Code of Conduct for Responsible Fisheries as it relates to ALDFG. - Develop national legislation that requires all fishing gear to be identified/marked - Establish national registers of fishing gear types (especially net types) used by their domestic fishing fleets. - Establish waste fishing gear buy-back schemes.	No date
	Waste prevention and management for LBS Improve stormwater management, including microlitter, to enter the marine environment from heavy weather events.	2018	
	Investigate and promote best available techniques as in wastewater treatment plants to prevent micro particles entering the marine environment.	2018	

	Assessment of the importance of sewage related waste coming from the upstream waste flow is produced. Share assessment with River and River Basin Commissions.	2017 2018	
	Define and implement appropriate instruments and incentives to reduce the use of plastic bags	2018	
	Cooperate on the establishment and/or further development of deposit refund systems for bottles, containers and cans (e.g. glass, plastics and aluminum)	2017 (Inform on study plans)	
	Remediation and removal actions		
	Cooperate on the establishment and/or further development of deposit refund systems for bottles, containers and cans (e.g. glass, plastics and aluminum).	2017 (Inform on study plans)	
	Remediation and removal actions A regional-wide map on landfills and dumpsites including historic ones, which may eventually pose a risk to the marine environment, is produced.	2020	
	Sea-based sources of litter Development of best practice on the disposal of old pleasure boats.	2018	
	Develop best practice in relation to inspections for MARPOL Annex V.	2017	
	Work on implementation and harmonization of the no-special-fee system in ports of the Baltic Sea countries.	2016 (start)	
	Promote and disseminate best practice in relation to all relevant aspects of waste management within the fishing sector.	2018	

	Compile information and elaborate guidelines on best practices to reduce the input of ALDFG from commercial and recreational fishing to the Baltic Sea.	2017	
Wider Caribbean Region Regional action plan on marine litter management (2014)	Solid Waste Management Strategies Maintain or develop	Specialised marine litter waste management strategies for public events.	No date
	To research	Best Management Practices in the hotel, restaurant and the marine transport industries/strengthen collaboration with the tourism sector for sharing of best practices and lessons learnt.	No date
	Develop and promote	Activities for national/regional waste minimisation	No date
	Develop and promote	International environmental certification programmes, which include waste management and minimization.	No date
	Maintain/develop	Specialised waste management strategies for marine litter problems associated with natural disasters.	No date
	Improve	Port reception facilities to effectively manage ship-generated waste.	No date
European Commission Towards a circular economy: A zero waste programme for Europe	Defining waste targets Proposal	- Boost reuse and recycling of municipal waste to a minimum of 70% - Increase the recycling rate for packaging waste by 80% - Ban the landfilling of recyclable plastics, metals, glass, paper and cardboard, and biodegradable waste.	- 2030 - 2030 (+ interim targets) - 2025

8.3. List of binding instruments reviewed in this assessment

International:

- *1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter*, opened for signature 13 November 1972, 1046 UNTS 120 (entered into force 30 August 1975) ('*London Convention*') <https://treaties.un.org/doc/Publication/UNTS/Volume 1046/volume-1046-I-15749-English.pdf>
- *1978 Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships of 2 November 1973, as amended*, opened for signature 17 February 1978, 1340 UNTS 184 (entered into force 2 October 1983) ('*MARPOL 73/78*') <https://treaties.un.org/doc/Publication/UNTS/Volume 1340/volume-1340-I-22484-English.pdf>
- *1982 United Nations Convention on the Law of the Sea* opened for signature 10 December 1982, 1833 UNTS 3 (entered into force 16 November 1994) ('*Law of the Sea Convention*') <http://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf>
- *1989 Basel Convention On The Control Of Transboundary Movements Of Hazardous Wastes And Their Disposal*, opened for signature 22 March 1989, 1673 UNTS 57 (entered into force 5 May 1992) ('*Basel Convention*') <http://www.basel.int/Portals/4/Basel Convention/docs/text/BaselConventionText-e.pdf>
- *1991 Convention on Environmental Impact Assessment in a Transboundary Context (ECE/MP.EIA/21)*, opened for signature 25 February 1991, 1989 UNTS 309 (No. 34028) (entered into force 10 September 1997) ('*Espoo Convention*') <http://www.unece.org/index.php?id=40450&L=0>
- *1992 Convention on Biological Diversity*, opened for signature 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993) ('*Convention on Biological Diversity*') <https://www.cbd.int/convention/text/default.shtml>
- *1995 The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks*, opened for signature 4 December 1995, 2167 UNTS 3 (entered into force 11 November 2001) ('*United Nations Fish Stocks Agreement*') <https://treaties.un.org/doc/Treaties/1995/08/19950804 08-25 AM/Ch_XXI_07p.pdf>
- *1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972*, opened for signature 7 November 1996, 36 ILM 1 (1997) (entered into force 24 March 2006) ('*London Protocol*') <http://www.austlii.edu.au/au/other/dfat/treaties/2006/11.html>
- *1997 Convention on the Law of the Non-Navigational Uses of International Watercourses*, opened for signature 21 May 1997, UN Doc A/RES/51/229 (entered into force 17 August 2014) ('*UN Watercourse Convention*') <http://www.un.org/documents/ga/res/51/ares51-229.htm>
- *1998 UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters*, opened for signature 25 June 1998, 2161 UNTS 447 (entered into force 30 October 2001) ('*Aarhus Convention*') <https://www.unece.org/env/pp/treatytext.html>
- *2001 Stockholm Convention on Persistent Organic Pollutants*, opened for signature 22 May 2001, 2256 UNTS 119 (entered into force 17 May 2004) ('*Stockholm Convention*') <https://treaties.un.org/doc/Treaties/2001/05/20010522 12-55 PM/Ch_XXVII_15p.pdf>
- *2011 Regulations for the Prevention of Pollution by Garbage from Ships (Resolution MEPC.201(62))*, opened for signature 15 July 2011, (entered into force 1 January 2013) ('*MARPOL Annex V*') <http://www.imo.org/en/OurWork/Environment/PollutionPrevention/Garbage/Documents/2014 revision/RESOLUTION MEPC.201(62) Revised MARPOL Annex V.pdf>

Regional:

- *1980 Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources and Activities, as amended 7 March 1996*, opened for signature 7 March 1996, 1328 UNTS 120 (entered into force 11 May 2008) ('*LBS/A Protocol for the Mediterranean*') <http://wedocs.unep.org/bitstream/handle/20.500.11822/7096/Consolidated_LBS96_ENG.pdf?sequence=5&isAllowed=y>
- *1981 Convention for Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region*, opened for signature 23 March 1981, 20 ILM (1981) 746 (entered into force 05 August 1984) ('*Abidjan Convention*') <http://abidjanconvention.org/index.php?option=com_content&view=article&id=100&Itemid=200&lang=en>
- *1981 Convention for the Protection of the Marine Environment and Coastal Area of the South-East Pacific*, opened for signature 12 November 1981, 1648 UNTS 3 (entered into force 19 May 1986) ('*Lima Convention*') <http://www.cpps-int.org/index.php/principal>
- *1983 Protocol for the Protection of the South-East Pacific Against Pollution from Land-Based Sources*, opened for signature 22 July 1983, UNTS 73 (entered into force 23 September 1986) ('*LBS Protocol for the South-East Pacific*') <http://www.cpps-int.org/index.php/principal>
- *1986 Convention for the Protection of the Natural Resources and Environment of the South Pacific Region*, opened for signature 24 November 1986, (entered into force 22 August 1990) ('*Noumea Convention*') <https://www.sprep.org/legal/noumea-convention>
- *1991 Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa*, opened for signature 30 January 1991, 2101 UNTS 211 (entered into force 22 April 1998) ('*Bamako Convention*') <https://www.opcw.org/chemical-weapons-convention/related-international-agreements/toxic-chemicals-and-the-environment/bamako-convention/>
- *1991 Protocol on Environmental Protection to the Antarctic Treaty of 1 December 1959*, opened for signature 4 October 1991, 402 UNTS 71 (entered into force 14 January 1998) ('*Madrid Protocol*') <https://www.ats.aq/documents/recatt/Att006_e.pdf>
- *1992 Convention for the Protection of the Marine Environment of the North-East Atlantic*, opened for signature 22 September 1992, 2354 UNTS 67 (entered into force 25 March 1998) ('*OSPAR Convention*') <http://www.ospar.org/convention/text>
- *1992 Convention on the Protection of the Marine Environment of the Baltic Sea Area*, opened for signature 9 April 1992, 1507 UNTS 167 (entered into force 17 January 2000) ('*Helsinki Convention*') <http://www.helcom.fi/Documents/About us/Convention and commitments/Helsinki Convention/1992_Convention_1108.pdf>
- *1992 Protocol on the Protection of the Black Sea Marine Environment against Pollution from Land-Based Sources*, opened for signature 21 April 1992, 32 ILM (1993) 1122 (entered into force 15 January 1994) ('*LBS Protocol for the Black Sea*') <http://www.blacksea-commission.org/_table-legal-docs.asp - odbsc>
- *1995 The Convention to Ban the importation into Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary Movement of Hazardous wastes within the South Pacific Region*, opened for signature 16 September 1995, 1857 UNTS 91 (entered into force 21st October 2001) ('*Waigani Convention*') <http://www.sprep.org/legal/the-convention-waigani>
- *1999 Protocol Concerning Pollution from Land-Based Sources and Activities to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region*, opened for signature 6 October 1999, TRE-001331 (entered into force 13 August 2010) ('*LBS/A Protocol of the Wider Caribbean*') <http://cep.unep.org/repcar/lbs-protocol-en.pdf>
- *2002 Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific*, opened for signature 18 February 2002, ('*Antigua Convention*') <https://wedocs.unep.org/rest/bitstreams/46335/retrieve>
- *2005 Protocol concerning the Protection of the Marine Environment from Land-Based Activities in the Red Sea and Gulf of Aden*, opened for signature 26 September 2005, ('*LBA Protocol of the Red Sea and Gulf of Aden*') <http://www.persga.org/Documents/Doc_62_20090211124355.pdf>

- *2009 Protocol on the Protection of the Marine Environment of the Black Sea From Land Based Sources and Activities*, opened for signature 07 April 2009, ('*LBS/A Protocol for the Black Sea*') <http://www.blacksea-commission.org/_convention-protocols.asp>
- *2010 Protocol for the Protection of the Marine and Coastal Environment of the Western Indian Ocean from Land-Based Sources and Activities*, opened for signature 31 March 2010, ('*LBS/A Protocol for the Western Indian Ocean*') <http://www.unep.org/nairobiconvention/protocol-protection-marine-and-coastal-environment-wio-land-based-sources-and-activities>
- *2012 Additional Protocol to the Abidjan Convention Concerning Cooperation in the Protection and Development of Marine And Coastal Environment from Land-Based Sources and Activities in the Western, Central and Southern African Region (UNEP(DEPI)/WACAF/LBSA/MOP1/2)*, opened for signature 22 June 2012, ('*LBS/A Protocol of Western, Central and Southern African Region*') <http://abidjanconvention.org/media/documents/protocols/LBSA Protocol-Adopted.pdf>
- *2012 Protocol for the Protection of the Caspian Sea Against Pollution from Land-based Sources and Activities to the Framework Convention for the Protection of the Marine Environment of the Caspian Sea*, opened for signature 12 December 2012, ('*LBS/A Protocol for the Caspian Sea*') <http://www.tehranconvention.org/IMG/pdf/Protocol_on_Pollution_from_Land_Based_Sources_and_Activities.pdf>
- *2013 Regional Plan on Marine Litter Management in the Mediterranean in the Framework of Article 15 of the Land Based Sources Protocol (Decision IG.21/7)*, opened for signature 6 December 2013, (entered into force 8 July 2014) ('*Action Plan for Marine Litter in the Mediterranean*') <http://www.unepmap.org/index.php?module=content2&catid=001011006>

- *2000 Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of-life vehicles*, OJ L 269, 21.10.2000, pp. 34-43 (entered into force 21 October 2000) ('*Directive 2000/53/EC on End-of-Life Vehicles*') <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM:l21225>
- *2002 Commission Directive 2002/72/EC relating to plastic materials and articles intended to come into contact with foodstuffs*, opened for signature 06 August 2002, OJ L 220, 15 August 2002, pp. 18-58 (entered into force 4 September 2002) ('*EU Directive 2002/72/EC on plastic in contact with foodstuffs*') <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32002L0072>
- *2008 Commission Regulation (EC) No 282/2008 of 27 March 2008 on recycled plastic materials and articles intended to come into contact with foods and amending Regulation (EC) No 2023/2006 (Text with EEA relevance)*, OJ L 86, 28.3.2008, p. 9–18http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32008R0282>
- *2008 Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive)*, OJ L 164, 25.6.2008, p. 19–40 (entered into force 17 June 2008) ('*MSFD, Directive 2008/56/EC*') <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32008L0056>
- *2011 Commission Regulation (EU) No 10/2011 of 14 January 2011 on plastic materials and articles intended to come into contact with food Text with EEA relevance*, OJ L 12, 15.1.2011, p. 1–89 ('*Regulation on Food Contact Material*') <http://eur-lex.europa.eu/eli/reg/2011/10/oj>

8.4. Links to current status of ratifications/accessions to interntional binding agreements

- United Nations Law of the Sea Convention
  http://www.un.org/depts/los/reference_files/chronological_lists_of_ratifications.htm

- United Nations Fish Stocks Agreement
http://www.un.org/depts/los/reference_files/chronological_lists_of_ratifications.htm

- United Nations Water Course Convention
https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-12&chapter=27&clang=_en

- Convention on the Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention)
https://www.informea.org/en/treaties/basel/parties

- Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention)
http://chm.pops.int/Countries/StatusofRatifications/PartiesandSignatoires/tabid/4500/Default.aspx

- Convention on Biological Diversity (CBD)
https://www.informea.org/en/treaties/cbd/parties

- Convention on the Conservation of Migratory Species of Wild Animals (CMS)
https://www.informea.org/en/treaties/cms/parties

- London Conventions and Protocols
http://www.imo.org/en/OurWork/Environment/LCLP/Documents/Parties%20to%20the%20London%20Convention%20and%20Protocol%20Aug%202017.pdf

- MARPOL Annex V
http://www.imo.org/en/About/Conventions/StatusOfConventions/Pages/Default.aspx

8.5. List of voluntary instruments reviewed in this assessment

International:

- UNGA, *Transforming our world: the 2030 Agenda for Sustainable Development*, A/Res/70/1, (The 2030 Agenda) <https://undocs.org/A/RES/70/1>
- United Nations, *Johannesburg Declaration on Sustainable Development (A/CONF.199/20) Chapter 1, Resolution 1*, (Johannesburg Declaration on Sustainable Development (A/CONF.199/20) Chapter 1, Resolution 1) <https://documents-dds-ny.un.org/doc/UNDOC/GEN/N02/636/93/PDF/N0263693.pdf?OpenElement>
- United Nations General Assembly, *Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments*, A/RES/60/31, (UNGA Resolution 60/31) (29 November 2005) <http://www.un.org/depts/los/general_assembly/general_assembly_resolutions.htm>
- Manila Declaration, *Manila Declaration on Furthering the Implementation of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities*, UNEP/GPA/IGR.3/CRP.1/Rev.1, (Manila Declaration) (27 January 2012) <http://www.unep.org/regionalseas/globalmeetings/15/ManillaDeclarationnew.pdf>
- *1995 FAO Code of Conduct for Responsible Fisheries*, ('*Code of Conduct*') <http://www.fao.org/docrep/005/v9878e/v9878e00.HTM>

- *The Honolulu Strategy, A Global Framework for Prevention and Management of Marine Debris,* 25 March 2011, (Honolulu Strategy) <http://www.unep.org/gpa/documents/publications/honolulustrategy.pdf>
- GPA, *Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA),* UNEP(OCA)/LBA/IG.2/7, (GPA) (3 November 1995) <http://unep.org/gpa/>
- *Montreal Guidelines for the Protection of the Marine Environment against Pollution from Land-Based Sources,* Decision 13/18/II, (Montreal Guidelines for LBS) (24 May 1985) <http://www.unep.org/law/PDF/UNEPEnv-LawGuide&PrincN07.pdf>
- IMO, *2012 Guidelines for the Development of Garbage Management Plans,* MEPC.220(63), (Resolution MEPC.220(63)) <http://www.imo.org/en/KnowledgeCentre/IndexofIMOResolutions/Marine-Environment-Protection-Committee-(MEPC)/Documents/MEPC.220(63).pdf>
- *2015 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Closing the loop - An EU action plan for the Circular Economy (COM/2015/0614),* http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614>

Regional:

- COBSEA, *Regional Action Plan on Marine Litter (RAP-MALI)* (2008) <http://www.cobsea.org/documents/Meeting_Documents/Marine Litter/Marine Litter Report 2008.pdf>
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8.6. Suggested Prioritisation and Timelines

Immediate:

- Identify and ban undesirable and unnecessary products and hazardous chemicals in production and recycling processes (Reduce)

- Identify opportunities for Reuse, the required components to enable this, identify incentives to design products for reuse and the infrastructure required (identification, collection, sorting, dismantling, etc)
- Begin analysis of the environmental impacts of Waste to Energy and any perverse incentives this may create (i.e. lower prioritization of reduction and reuse)

Short-term:

- Begin analysis of national legislation in the context of prevention from all sources, mitigation and cleanup
- Establish dedicated government bodies to oversee solid waste management policies, implementation and monitoring.
- Improve collection, transport, storage, sorting and disposal services with the aim of diverting waste from the oceans and preventing leakage in all lifecycle components
- Clearly link plastic pollution to air and water quality standards, particularly primary microplastics, additives, chemicals used for recycling, release of toxins from incinerators
- Set national collection targets, landfill reduction targets, recycle targets, % post-consumer content targets for different types of plastics and applications
- Enhance support for research into secondary and tertiary recycling

Medium-term:

- Establish global standards for waste stream definitions, criteria and labeling to assist in purifying waste streams to increase their value.
- Improve sorting services to meet requirements of domestic and international recycling industry (where exported), make more plastic types recyclable, meet landfill reduction targets
- Implement economic instruments to disincentivise undesirable plastics and additives
- Identify economic incentives at national level to promote 6Rs, focusing on reduction of unnecessary and undesirable products, incentives to design products for reuse (and the infrastructure, collection, sorting this may require) diversion from landfill, sustainable recycling practices
- Improve classification of hazardous components of plastic production and treatment under the Basel, Stockholm and Rotterdam Conventions

Long-term:

- No leakage to ocean from all sources
- Effective EIA, SEA processes in place with global standards
- Compliance with sustainable global recycling standards in all regions
- Hazardous substances eliminated from lifecycle of plastics, highly regulated where not possible to eliminate
- Close cooperation between design and 3Rs
- All plastic types are collected, sorted and recycled irrespective of 'value'

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